Libby Asbestos Site
Libby, Montana

Draft Sampling and Analysis Plan, Remedial Investigation, Contaminant Screening Study, Libby Asbestos Site, Operable Unit 4

April 2002

Draft Sampling and Analysis Plan

Response Action Contract
for Remedial, Enforcement Oversight, and Non-Time
Critical Removal Activities at Sites of Release or
Threatened Release of Hazardous Substances
in EPA Region VIII

U S EPA Contract No 68-W5-0022

Draft Sampling and Analysis Plan, Remedial Investigation, Contaminant Screening Study, Libby Asbestos Site, Operable Unit 4

April 5, 2002

Work Assignment No 116-RIRI-08BC
Document Control No 3282-116-PP-SAMP-14187

Prepared for
U S Environmental Protection Agency
Region VIII
999 18th Street, Suite 500
Denver, Colorado 80202

Prepared by
CDM
1331 17th Street, Suite 1050
Denver, Colorado 80202

Response Action Contract
for Remedial, Enforcement Oversight, and Non-Time
Critical Removal Activities at Sites of Release or
Threatened Release of Hazardous Substances
in EPA Region VIII

U S EPA Contract No 68-W5-0022

Draft Sampling and Analysis Plan, Remedial Investigation, Contaminant Screening Study, Libby Asbestos Site, Operable Unit 4

Work Assignment No 116-RIRI-08BC

FSP Prepared by _____ Date 4/5/02
Thomas E Cook
CDM Project Scientist

QAPP Prepared by _____ Date 4/5/02
Dee A Warren
CDM Project Scientist

Reviewed by _____ Date 4/5/02
David Schroeder, P G
CDM Onsite Manager

Reviewed by _____ Date 4/5/02
RoseMary Gustin
RAC VIII QA Manager

Approved by _____ Date _____
Jim Christiansen
EPA Region VIII Remedial Project Manager

DISTRIBUTION LIST

Jim Christiansen (12 copies)
EPA Remedial Project Manager
EPA Region VIII, Denver, Colorado

John McGuiggin (4 copies)
Volpe Center Performance Manager
Volpe Center, Cambridge, Massachusetts

Brian Stewart (1 copy)
Pacific Environmental Services (PES) Project Manager
PES, Herdon, Virginia

Tim Wall (1 copy)
CDM Libby Project Manager
CDM Cambridge, Massachusetts

David Schroeder (1 copy)
CDM Onsite Manager
CDM Fairfax, Virginia

Jeff Montera (4 copies)
CDM Remedial Project Manager
CDM Denver, Colorado

CDM Field Office
CDM Libby, Montana

CDM Project File
CDM Denver, Colorado

Contents

Section 5 Project Management and Data Quality Objectives

Section 6 Measurement and Data Acquisition

Tables

Figures

Acronyms

AD	address location identification number
ASTM	American Society for Testing and Materials
ATSDR	Agency for Toxic Substances and Disease Registry
CAR	corrective action request
CDM	CDM Federal Programs Corporation
CIC	community involvement coordinator
COC	chain-of-custody
CSS	contaminant screening survey
DI	deionized water
DQOs	data quality objectives
EDD	electronic data deliverable
EPA	U S Environmental Protection Agency
ERB	Emergency Response Branch
FSDS	field sample data sheet
FSP	field sampling plan
g	gram
GIS	geographic information system
GPS	global positioning system
Grace	W R Grace
HASP	health and safety plan
HDPE	high-density polyethylene
HSO	health and safety officer
ID	identification
IDW	investigation-derived waste
IFF	information field form
In	inches
IR	infrared spectroscopy
ISO	International Organization of Standards
KNF	Kootenai National Forest
L	liter
LAA	Libby amphibole asbestos
LCS	laboratory control sample
MDLs	method detection limits
mi^2	miles squared
mL	milliliter
NIOSH	National Institute of Occupational Safety and Health
NPL	National Priorities List
OSC	on-scene coordinator
OSHA	Occupational Safety and Health Administration
OU	operable unit
PARCC	precision accuracy representativeness, completeness and comparability
PLM	polarized light microscopy
PPE	personal protective equipment

QA	quality assurance
QAPP	quality assurance project plan
QC	quality control
QMP	quality management plan
QP	quality procedure
RAC	Response Action Contract
RI	remedial investigation
RPD	relative percent difference
RPM	remedial project manager
SAP	sampling and analysis plan
SEM	scanning electron microscopy
SOP	standard operating procedure
SP	sample point location identification number
TEM	transmission electron microscopy
USFS	U S Forest Service
USGS	U S Geological Survey
Volpe Center	John A Volpe National Transportation Systems Center
ZAI	zonolite attic insulation
Zonolite	Universal Zonolite Insulation Company
°F	degrees Fahrenheit

This page intentionally left blank

Section 1
Introduction

This document serves as the sampling and analysis plan (SAP) for the contaminant screening study (CSS) as part of the remedial investigation (RI) activities for the Libby Asbestos Site Operable Unit 4 (OU) under the Response Action Contract (RAC) This SAP outlines the support that CDM Federal Programs Corporation (CDM) will provide to the U S Environmental Protection Agency (EPA) under Work Assignment 116-RIRI-08BC

This section provides a general explanation of purpose of the CSS and background information related to the initiation of the CSS An expanded site background is provided in Section 2

Previous sampling investigations at the Libby Asbestos Site include the Phase I and Phase II sampling efforts

The Phase I sampling program, initiated in early 2000, was designed as a rapid pilot-scale investigation to obtain information on airborne asbestos levels in Libby in order to judge whether a time-critical intervention was needed to protect public health obtain data on asbestos levels in potential source materials, and identify the most appropriate analytical methods to screen and quantify asbestos in source materials Phase I sampling activities are on-going, and the Phase I quality assurance project plan (QAPP) (EPA 2000a) will be the guidance document for the collection of samples not specific to the CSS, on-going removal actions, or the Phase II investigation

Results of initial Phase I sampling prompted removal actions at various sites in and around Libby the screening and export plants, the Flyway, KDC Bluffs Plummer Elementary, Libby High School Libby Middle School and several residential and commercial properties Removal actions continue at the screening and export plants, as well as various residential and commercial properties These removal actions are designed to remove major sources of Libby amphibole asbestos (LAA) in and around the city of Libby The major concern of the LAA is the content of tremolite

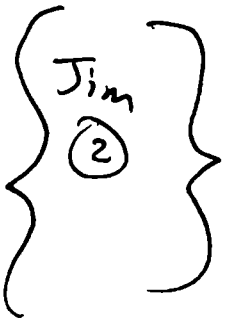
The Phase II sampling investigation began in March 2001 and was designed to collect systematic data on asbestos levels in air and other media in Libby to allow a reliable evaluation of current human exposure and health risk from asbestos as well as an identification of sources of unacceptable levels of asbestos, in air A summary of the findings (EPA 2001) of the Phase I and II studies are presented below

- Asbestos occurs in ore and processed vermiculite obtained from the mine site located outside the city of Libby
- Asbestos fibers of the type that occur in vermiculite ore from the mine site are hazardous to humans when inhaled

- Asbestos material fibers that are characteristic of those that occur in materials from the Libby mine are present in a variety of different source materials at residential and commercial locations in and around the community of Libby Outdoor source materials include yard soil garden soil driveway material and assorted mine waste materials while indoor source materials include dust and vermiculite insulation

- Disturbance of asbestos-contaminated source materials can result in exposure to respirable asbestos fibers in air

- The concentrations of fibers in air generated by disturbance of source materials may exceed the Occupational Safety and Health Administrations (OSHA) standards for acceptable occupational exposures and estimated excess cancer risks can exceed EPA s typical risk range by an order of magnitude or more



Following the results of the Phase I and II investigation the EPA has determined each property in the Libby Valley requires screening The CSS will use visual and verbal screening to search for obvious primary sources (e g zonolite attic insulation [ZAI], vermiculite products and waste tremolite rocks and soils greater than 1 percent asbestos by weight) and other indicators of potential secondary sources (e g contaminated indoor dust and outdoor soils) coupled with low detection limit presence/absence analytical techniques to screen all properties in the Libby Valley ZAI refers to potential zonolite LAA containing attic insulation, potentially LAA containing attic inculation and/or material

This SAP is comprised of a field sampling plan (FSP) and a QAPP specific to the CSS The purpose of this FSP is to provide guidance to ensure that all environmentally-related data collection procedures and measurements are scientifically sound and of known, acceptable, and documented quality and that they are conducted in accordance with the requirements of the project The following sections and appendices are included in this SAP

Section 1 Introduction
Section 2 Site Background

Part 1 Field Sampling Plan

Section 3 Sampling Program Rationale and Locations
Section 4 Field Activity Methods and Procedures

Part 2 Quality Assurance Project Plan

Section 5 Project Management and Data Quality Objectives (DQOs)
Section 6 Measurements and Data Acquisition
Section 7 Assessments and Oversight
Section 8 Data Validation and Usability

Section 9 References

Appendix A CDM Technical Standard Operating Procedures (SOPs) and Site-Specific Guidance Documents
Appendix B Site Health and Safety Plan (HASP)
Appendix C Volpe Center Paperwork Flow Process
Appendix D Laboratory Training Outline

1 1 Objective

The objective of this investigation is to determine the presence or absence of potential LAA sources at each property within the study area The CSS results will support remedial decisions on a property-by-property basis All properties will be screened for the presence of primary sources of LAA

Jim (3)

1 2 Project Schedule and Deliverables

Field work to initiate the CSS is expected to begin on or about May 12, 2002 and continue until October 2002 See the project work plan (CDM 2002) for schedule of additional deliverables Resulting project deliverables will include a section regarding adherence to this SAP, deviation that occurred and any resulting corrective action taken

This page intentionally left blank

Section 2
Site Background

2.1 Site Location

The Libby Asbestos Site is located within Sections 3 and 10, T30N R31W of the Libby Quadrangle in Lincoln County, Montana (Figure 2-1) It includes a vermiculite mine two former vermiculite processing centers, the former screening plant and the former export plant, the road between the former screening plant and the mine site (Rainy Creek Road), and homes and other businesses which may have become contaminated with asbestos fibers as a result of the vermiculite mining and processing conducted in and around the city of Libby

2 2 Site History

Vermiculite was discovered 7 miles northeast of Libby Montana in 1881 by gold miners In the early 1920s, Mr Edward Alley began initial mining operations on the vermiculite ore body located approximately 7 miles northeast of Libby Full-scale operations began later that decade under the name of the Universal Zonolite Insulation Company (Zonolite) This ore body contained amphibole asbestos fibers of the tremolite-actinolite-richterite-winchite solid solution series (herein referred to as LAA) Unlike, the commercially exploited chrysotile asbestos, the Libby amphibole material has never been used commercially on a wide scale, and for the mine s operating life, it was considered a byproduct of little or no value The commercially exploited vermiculite was used in a variety of products, including insulation and construction materials as a carrier for fertilizer and other agricultural chemicals and as a soil conditioner

The vermiculite ore was mined using standard strip mining techniques and conventional mining equipment The ore was then processed in an onsite dry mill to remove waste rock and overburden material Once cleaned", the processed ore was transported down from the mine to the former screening plant which sorted the ore into five size ranges After the sorting process the material was shipped to various locations across the United States, for either direct inclusion in products or for "expansion' prior to use in products Expansion (also known as 'exfoliation or "popping) was accomplished by heating the ore, usually in a dry kiln, to approximately 2000 degrees Fahrenheit (°F) This process boiled the water trapped in the crystalline matrix of the vermiculite and expanded the material by a factor of 10 to 15 This produces the vermiculite material most commonly seen in stores and sold as soil conditioner for gardens and greenhouses

In Libby, operations handling this material occurred at four main locations the mine and mill located on Rainy Creek Road on top of Zonolite Mountain, the former screening plant and railroad loading station located at the intersection of Highway 37 and Rainy Creek Road and directly across the Kootenai River, respectively, the former expansion/export plant (the former export plant) located immediately west of Highway 37 where it crosses the Kootenai River and at the former expansion plant located at the end of Lincoln Road, near 5th Street (Figure 2-2) The Lincoln Road

Expansion Plant went off line sometime in the early 1950s Investigations are underway to determine the exact location of this facility

Jim (4)

All structures at the former screening plant have been demolished and approximately 90 000 cubic yards of contaminated soils have been removed and placed in the mine Restoration of the former screening plant is expected to be completed in late 2002 Similarly all structures except the planer building have been demolished at the former export plant site and approximately 5 000 cubic yards of contaminated soils have been removed and placed in the mine Completion of clean-up activities at the former export plant is expected to be completed in 2002 [The Lincoln Road Expansion Plant went off line sometime in the early 1950s Investigations are underway to determine the exact location of this facility] Removal activities have not been initiated at the mine or railroad loading station

In 1963 the W R Grace Company (Grace) purchased Zonolite and continued vermiculite-mining operations in a similar fashion In 1975 a wet milling process was added which operated in tandem with the dry mill until the dry mill was taken off line in 1985 The wet milling process was added to reduce dust generation of the milling process Expansion operations at the former export plant ceased in Libby sometime prior to 1981 although this area was still used to bag and export milled ore until mining operations were stopped in 1990 Before the mine closed in 1990, Libby produced about 80 percent of the world s supply of vermiculite

Jim (5)

Since 1999 EPA Region VIII s Emergency Response Branch (ERB) has been conducting sampling and cleanup activities to address highly contaminated areas in the Libby Valley The ERB investigation was initiated in response to media articles, which detailed extensive asbestos-related health problems in the Libby population While at first the situation was thought limited to those with direct or indirect occupational exposures, it soon became clear that there were multiple exposure pathways and many persons with no link to mining-related activities affected

^ were

Typically, the amphibole asbestos contamination found in the Libby Valley comes from one or some combination of primary sources vermiculite mining wastes, vermiculite ores vermiculite processing wastes, bulk residuals from vermiculite processing tremolite rocks " or ZAI Asbestos from these primary sources has been found in interior building dust samples and local soils which in turn act as secondary sources To date the goal of ERB has been to find and identify areas with elevated levels of asbestos (the primary sources) and to remove them ERB has conducted contaminated soil removals at the former export plant location the former screening plant and adjacent properties, and several residential properties with asbestos source materials present Three schools in the Libby school system have also had removals performed Details of these operations can be found in the applicable Action Memorandums

Jim (6)

Future work in Libby is aimed at continuing to identify and remove areas with primary sources but on a broader scale In that regard EPA is currently considering

the removal of all ZAI from homes in the Libby Valley In addition a shift to secondary sources where risks may be more of a chronic nature as opposed to acute will be implemented in 2002 The proposal to add the Libby Asbestos Site to the National Priorities List (NPL) will help to facilitate both of these goals NPL listing is expected in early 2002 In anticipation of NPL listing, EPA is initiating an RI aimed at addressing both goals for the entire Libby Valley

For long-term management purposes, the Libby Asbestos Site has been divided into two operable units (OU) Operable Unit 3 (OU3) which represents the former mine and Rainy Creek Road, and Operable Unit 4 (OU4), which represents the remainder of the Libby Valley This FSP has been prepared to address investigative activities associated with OU4 only Work associated with OU3 is expected to be planned in the near future

2 3 Environmental Setting

Mean annual precipitation in Libby is 19 4 inches (in), with 37 percent occurring between the months of November through January In addition, eighteen percent of the annual precipitation occurs during the months of May and June The month having the highest average precipitation is January, with 2 42 in Average ambient temperature in Libby ranges from 22 4°F in January to 67°F in July Average annual precipitation at the mine site is estimated at 20 in per year and the temperature would be expected to average 3 to 5 degrees cooler due to the higher elevation relative to the city of Libby Climatological data was obtained from the Libby 1 N E Ranger Station 5 miles northeast of Libby

2 4 Contaminant of Concern

The contaminant of concern for this investigation is LAA Asbestos fibers are odorless and tasteless and vary in length, structure and chemical composition Fibers are microscopic and environmentally persistent They do not evaporate burn or dry out from heat or erode in water The toxicity of different types of asbestos fibers varies but chronic and acute exposure to any one of them can potentially be fatal Tremolite asbestos, the form associated with the mined vermiculite in Libby, is considered by many to be the most toxic

The human health risks associated with asbestos fibers released in the environment include

- Malignant mesothelioma, a cancer of the pleural or peritoneal cavity In early stages of the disease, cancer is found in the lining of the chest cavity near the lung and heart or in the diaphragm Mesothelioma may spread to tissue surrounding the lungs or other organs Virtually all mesothelioma cases are attributable to asbestos exposure

- Asbestosis, the scarring of the tissue of the lung itself from inhalation of fibers It ranges in severity from mild impairment to disabling and eventually fatal

This page intentionally left blank

Eureka

Troy

Libby

Locus Map

Lincoln County, Montana

Site Location Map

Libby, Montana

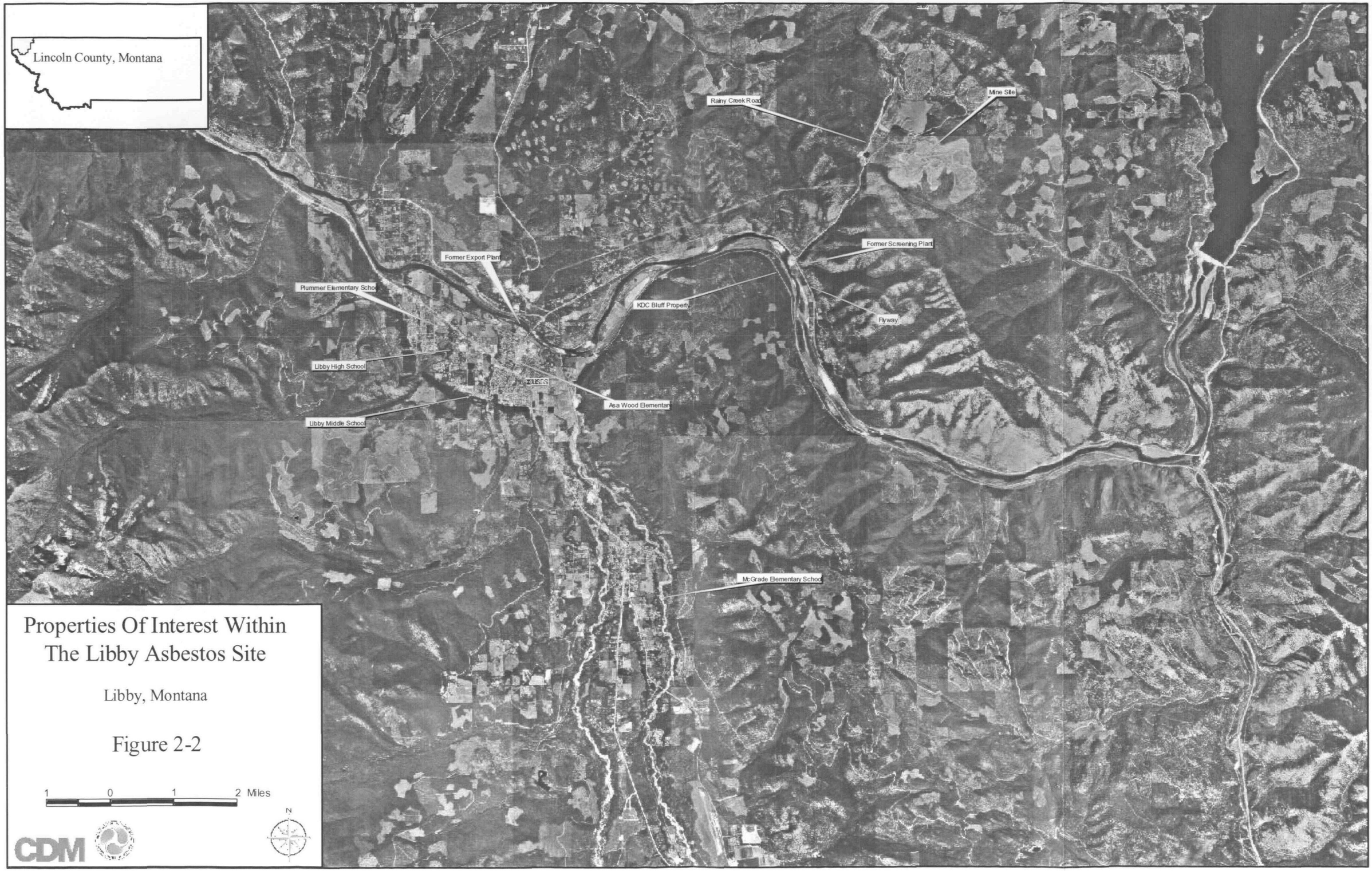
Figure 2-1

Major Roads

Lincoln County

CDM

N


Lincoln County, Montana
Rainy Creek Road
Mine Site
Former Screening Plant
Former Export Plant
Plummer Elementary School
KDC Bluff Property
Flyway
Libby High School
Asa Wood Elementary
Libby Middle School
McGrade Elementary School
Properties Of Interest Within
The Libby Asbestos Site
Libby, Montana
Figure 2-2
1 0 1 2 Miles
N
CDM

Part 1 Field Sampling Plan

This page intentionally left blank

Section 3
Sampling Program, Rationale, and Locations

Sections 3 and 4 comprise the FSP for the Libby RI CSS activities (Part 1 of the SAP) This section describes the screening process and soil sampling for residential and commercial properties within the study area Specific sampling methods and procedures are presented in Section 4

3 1 Contaminant Screening Study

The CSS consists of a screening process and subsequent soil sampling to identify sources (primary and secondary) of LAA within the study area The boundaries of the study area are discussed in Section 3 2 Primary sources may include ZAI vermiculite products and waste, tremolite rocks highly contaminated soils (e g soils containing greater than 1 percent by weight LAA), and equipment originating from the mine site The presence of a primary source of LAA may indicate that secondary sources, such as contaminated indoor dust and outdoor soil may also be present Results of this investigation will be used to classify properties within the study area with the following designations

- Property is clean (i e , no primary or secondary LAA contamination inside or outside)
- Property has primary sources of LAA present and immediate removal activities may be conducted
- Property does not have primary sources of LAA present but is contaminated with secondary sources Further investigation may be required to determine if removal activities will be conducted

3 2 Study Boundaries

The CSS will focus on all residential and commercial properties within the study area (Figure 3-1) ~~Large commercial properties will be addressed on a property-by-property basis.~~ Natural physiographic features have defined the study area, which encompasses the city of Libby and surrounding areas where LAA contamination has historically been found The total area of the study area is approximately 192 square miles (mi^2) Areas where structures do not exist and/or where conditions indicate (i e vegetation predates mining activities) sources of contamination were not introduced will not be included in the CSS investigation except on a case-by-case basis after consultation with EPA (9)

3 3 Study Process

The CSS process is designed to systematically screen and sample every property within the study area and will include the following steps

- Selecting study locations
- Public awareness and reconnaissance
- Field screening and sampling activities
- Sample analysis and data validation

3 3 1 Selecting Study Locations

While the study will initially target the denser populated areas of the study area (i e Libby proper) some of the study area border properties will be simultaneously investigated to obtain data from perimeter properties The purpose of this approach is to provide information to decision makers during the investigation as to any contamination trends that may exist (i e , perimeter properties having less contamination) In addition commercial properties will receive priority status for the CSS so business owners can become familiar with their situation regarding LAA contamination Approximately 20 to 25 residential and commercial properties will be screened and sampled per day An example sampling diagram detailing how soil samples will be segregated is included as Figure 3-2

Data collected on a daily basis (i e questionnaires and northing and easting coordinates) will be entered into a geographic information system (GIS) database in order to provide up-to-date tracking of properties visited and results obtained This information will be used to evaluate progress and identify areas requiring immediate consideration for potential removal activities

3 3 1 1 Screen Previous Data

Relevant property data (completed questionnaires and soil sample results) collected during the previous Phase I investigation will be evaluated to determine if sufficient information exists to satisfy the DQOs (Section 5) Soil samples collected from these properties during Phase I activities were analyzed by polarized light microscopy (PLM) and then archived The archived sample will be submitted for additional analysis as described in Section 3 3 4 If sufficient data exists to satisfy the DQOs then these properties will be exempt from the CSS investigation and the existing data will be used to confirm the presence or absence of LAA

3 3 1 2 Study Area Grid

A grid system has been applied to the study area (Figure 3-3) The study area is divided into 192 individual grids each measuring 1 mi^2 (1-192) The grids are numbered from top left to bottom right and identified with a grid number (i e 01, 02 03 etc) Within each grid tile the 1-mi^2 area is divided into four separate ¼ mi^2 quadrants (A [northwest] B [northeast], C [southwest], and D [southeast]) Where properties and populations are denser the quadrants will be further divided into four separate 1/16-mi^2 sections (1 [northwest] 2 [northeast], 3 [southwest], 4 [southeast]) A grid tile/quadrant/section will be considered complete when all residential and commercial properties have been

- Screened and sampled or
- Deemed exempt from the CSS investigation as described in Sections 3 2 and 3 3 1 1

U S Forest Service Land
In addition to the residential and commercial properties, a large area of U S Forest Service (USFS) land (Kootenai National Forest [KNF]) is within the study area CDM will coordinate with the KNF forest supervisor to determine the locations of USFS-owned structures within the study area Access agreements will be obtained and screening and sampling times will be scheduled so the necessary information for these structures can be collected

3 3 1 3 Contingency Issues

Various scenarios may arise that necessitate prioritizing and scheduling a CSS investigation at specific properties These scenarios may include but not be limited to

- Real estate transactions
- Excessive contamination exposure (i e , ZAI falling into living space)
- Property damage (i e , fire, flood etc)
- Current remodeling efforts (i e exposed areas)
- Community events (i e , festivals, fairs, parades, etc)
- Limited times when property owner is available

These situations will be addressed on a case-by-case basis When a specific property does require an immediate investigation, the property owner will be contacted to schedule an appointment as soon as possible A field team will then be dispatched to that property to complete the investigation

3 3 2 Public Awareness and Reconnaissance

Communicating information to the public regarding the CSS investigation is invaluable to the success of this investigation The communication aspect of the CSS investigation will include

- Community relations
- Reconnaissance team

3 3 2 1 Community Relations

CDM will coordinate with the EPA community involvement coordinator (CIC) to ensure sufficient advertising (i e , public meetings, newspaper articles, door flyers radio announcements, etc) will be conducted prior to the investigation process The roles and responsibilities of the CIC are discussed in Section 5 Initially public

announcements regarding the CSS will be advertised throughout the study area to familiarize the community with the investigation approach

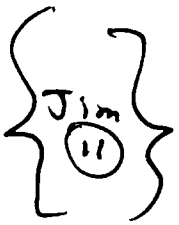
3 3 2 2 Reconnaissance Team

Personal visit will be conducted at the property owners home approximately 1 week before CSS investigation activities begin in a selected area This visit will be performed by a CDM reconnaissance team consisting of two team members The field reconnaissance team will be dispatched to a predetermined area to personally notify property owners of the following weeks CSS activities The field reconnaissance team will visit approximately 25 houses per day The visit will include explaining the screening and soil sampling process answering any pertinent questions obtaining signed access agreements and obtaining any additional useful information (i e time when property owner will most likely be available) To expedite the notification process the field reconnaissance team will not perform any screening and/or sampling activities If the property owner has questions not specifically related to the CSS fieldwork they will be directed to the EPA Information Center for additional information If property owners are not available during the reconnaissance, the team will leave a flyer detailing CSS investigation and contact information The reconnaissance team will revisit properties until the owner can be reached

Access agreements will be obtained before any screening or sampling activities begin If a property owner refuses to allow the CSS investigation to be conducted on their property, field activities will not be conducted A list of property owners who refuse to participate in the CSS will be maintained and provided to the EPA remedial project manager (RPM)

3 3 3 Field Screening and Sampling Activities

The CSS screening and sampling activities will be performed by a CDM field team consisting of two field team members The field team will visit houses approximately 1 week after the reconnaissance team has visited the area The CSS screening and sampling activities will include



- Visual Inspection
- Verbal interview
- Soil sampling

3 3 3 1 Verbal Interview

The screening process will begin with a verbal interview with the property owner to acquire background information on the property The verbal interview is organized to collect as much known history about the property and/or structures to satisfy the DQOs (Section 5) The verbal interview process will involve the following steps

- Obtain access agreements (if necessary)
- Conduct interview

- Visual confirmation of ZAI

- Sketch plan-view of house (if ZAI is present)

Obtain Access Agreements
Access agreements will be collected during the reconnaissance team visit with property owners If access agreements were not obtained during this visit, then the field team will collect them before CSS investigation activities begin

Conduct Interview
The interview will address issues such as the use of ZAI (in the house, sheds barns etc) and the possible introduction of other primary sources within (i e garden landscaped areas, etc) or near (i e , neighbor) the property Additional information regarding mine exposure, asbestos-related diseases and the use of vermiculite in building materials on the property The information collected during the interview will be recorded on an IFF (Appendix A)

Visual Confirmation of ZAI
The field team will visually confirm the presence or absence of ZAI within the house and/or structures One field team member will access the attic and perform a visual inspection, documenting pertinent information in the field logbook field sample data sheet (FSDS), and screening questionnaire (i e IFF) The field team member will check under other types of insulation (e g , blown-in cellulose, fiber glass etc) to verify that ZAI is not hidden In addition the field team will investigate other areas where ZAI may be exposed in living spaces (i e , closets circuit breaker boxes etc)

Structure Sketch
A plan-view sketch of the interior of the structure will be drawn to supplement the questionnaire only if ZAI is present This sketch will include all floors and detail areas of concern as discussed with the property owner This information will be used for subsequent removal actions (if necessary) and long-term management decisions The house sketch will be drawn on the IFF

Buildings within a specific property will be classified as primary or secondary A primary building is the main habitable structure (i e , house, apartment, main commercial space) Secondary buildings include non-habitable structures (i e garages sheds, barns, etc) A visual inspection to confirm the presence or absence of primary sources of LAA will be performed and an IFF will be completed for every building located within the property boundary

3 3 3 2 Soil Sampling

The purpose of soil sampling is to quantitatively verify the presence or absence of LAA in soils where exposure is most likely to occur and to satisfy the DQOs (Section 5) Soil sampling activities will commence once the verbal interview has been completed The soil sampling process will involve the following steps

- Sketch property

- Segregate land use areas and zones (if applicable)
- Visually inspect land use areas for visible vermiculite
- Determine sampling locations
- Collect samples
- Record sample locations using GPS equipment

Sketch Property
A site layout sketch of the property will be drawn prior to sampling This sketch will include major features (i e trees drainage ditches utility poles etc) and sampling locations The site layout sketch will be drawn on the IFF

Segregate Land Use Areas
The property will be sectioned into land use areas for sampling purposes Use areas may include but not be limited to

- Yard (grassy areas)
- Landscaped area
- Garden
- Fill area

Yards greater than ½ acre in size will be sectioned off into separate zones for increased accuracy in characterization Sectioning yards into additional zones will be at the discretion of the CDM field team

Visual Inspection
The field team will inspect all exposed soil areas within the property paying special attention to areas where known primary sources of LAA may have been introduced and high traffic areas where contamination is most likely to be tracked indoors Soil samples will not be collected from land use areas where visible vermiculite product is observed Instead the field team will record specific details in the field logbook and the IFF including location of contaminated source approximate volume estimated percentage of product, and how long the contaminated source material has existed on the property

Determine Sampling Locations
Up to five composite soil samples will be collected per property Composite soil samples will be collected from similar land use areas (i e , yard, garden stockpiled soil etc) For example a composite yard sample will only include subsamples originating from the yard land use area (i e , no garden fill soils included) Additional composite or grab samples may be collected depending on site conditions (i e multiple land use areas zones etc) Conversely not all land use areas previously

mentioned will be applicable at every property and fewer samples (not less than two) will be collected Therefore, the CDM field team will use professional judgment in determining how soil samples will be collected in order to adequately characterize each property An example sampling diagram detailing how soil samples will be segregated, is included as Figure 3-2

Two to five composite samples will be collected at each property For non-disturbed areas (i e , yard), composite samples will be collected from 0 to 1 in For disturbed areas (i e , garden, fill area landscaped areas, etc) composite samples will be collected from 0 to 6 in All composite soil samples will have no more than five subsamples (i e , 5 point composite sample) Site conditions may require that fewer subsamples be collected

Collect Samples
All soil samples will be collected as described in Section 4 5

Record GPS Locations
For each sample collected, a GPS point will be recorded Since samples will consist of composites, the midpoint of each composite group of samples will be recorded All necessary information will be entered into the GPS data dictionary

Location identification numbers will be assigned for each sample location Location identification numbers include address location identification numbers (AD) and sample point location identification numbers (SP) numbers as discussed below Each structure on a property will be surveyed using GPS field equipment and a location identification number associated with the structure will be assigned Identification numbers associated with structures will be in the form AD-##### For each sample point collected outside a building GPS points will be collected and the location identification number associated with the sample point will be in the form of SP-##### The procedure for fully implementing this process is currently in development with CDM and Volpe and will be incorporated into this SAP when finalized

3 3 3 3 Dust Sampling

Dust samples will not be collected in conjunction with the CSS investigation However, when deemed necessary by the EPA, dust samples may be collected by the field team at specific properties All dust samples will be collected in accordance with Libby Asbestos Project Phase I QAPP (EPA 2000a)

3 3 4 Sample Analysis and Data Validation

Soil samples will be analyzed for LAA by the infrared (IR) method (ISSI-LIBBY-02) Depending on sample results a sample split may be submitted for analysis using the scanning electron microscopy (SEM) method (Asbestos Analysis of Soil by Scanning Microscopy and Energy Dispersive X-Ray Spectroscopy, Revision 0 July 11 2000) Once the CSS investigation has been completed for a specific property, the CIC will mail the owner a follow-up letter detailing the results of the investigation and

additional information regarding any necessary further activities The data validation process will follow the procedures outlined in Section 8 and the site specific SOP for Data Validation of Asbestos Results Obtained by Reflectance Spectroscopy and Scanning Electron Microscopy (Appendix A)

3 4 Field Quality Assurance/Quality Control Measures

The following field quality assurance (QA)/quality control (QC) measures are designed to ensure that data collected in the field are of sound quality These will include

- Reconnaissance and field team orientation
- Qualitative field checks
- Field duplicates of soil samples
- Preparation duplicates of soil samples
- Rinsate blanks
- Field form completion checks
- Field audits

Reconnaissance and Field Team Orientation
Due to the longevity of the CSS, several field team members will rotate shifts throughout the field effort CDM will make a conscious effort to utilize personnel (when available) with prior experience in performing similar activities in the Libby Asbestos Project Phase I investigation All reconnaissance team members will be required to participate in a reconnaissance team orientation which will cover the overall CSS process personal communication skills access agreement form completion, and identification of primary and secondary contamination sources All field team members will be required to participate in a field team orientation which will include discussing the CSS investigation approach sampling techniques communication skills access form completion, identification of primary and secondary LAA sources and proper completion of all field forms

Qualitative Field Checks
Qualitative field checks will be performed by the CSS task leader and will include supplemental verification of vermiculite product and screening field checks Supplemental verification of vermiculite product will be performed when the field team cannot identify, with confidence vermiculite and/or primary sources of LAA product The CSS task leader will meet the field team at the property to assist in the identification process

Screening field checks will also be conducted on properties where the CSS investigation has been completed The CSS task leader will pull the completed field

forms and revisit the property to verify the correct information has been recorded Screening field checks will be conducted at a rate of 2 percent (1 per 50) properties

Field Duplicates of Soil Samples
Field duplicates of soil samples will be collected at a frequency of 1 in 20 (5 percent) A detailed discussion concerning field duplicates is included in Section 5 4 2 4

Preparation Duplicates of Soil Samples
Preparation duplicate soil samples will be submitted at a frequency of 1 in 20 (5 percent) or one per preparation batch, whichever is more frequent A detailed discussion concerning preparation duplicates is included in Section 5 4 2 4

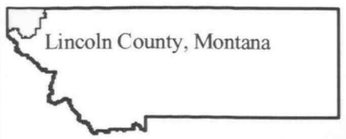
Rinsate Blanks
Rinsate blanks will be collected as described in Section 5 4 2 4

Field Form Completion Checks
All field forms (IFF and FSDS) will be completed in the field before leaving a property To ensure that all applicable data is entered and all necessary fields are populated a different field team member will check each field form

Field Audits
A field audit will be performed during the first month of the field effort The field effort is expected to last for 6 months, and a second field audit will be completed during the third month of the field effort If significant CSS procedural changes occur during the study an additional field audit will be conducted to ensure the new methods are implements and followed appropriately

This page intentionally left blank

Locus Map



Rainy Creek Road

Mine Site

Libby Dam

Lincoln County Landfill

Former Export Plant

Former Screening Plant

Plummer Elementary School

KDC Bluff Property

Flyway

Libby High School

Asa Wood Elementary

Libby Middle School

Siefke Residence

McGrade Elementary School

Contaminant Screening Study Boundary

Libby, Montana

Figure 3-1

1 0 1 2 Miles

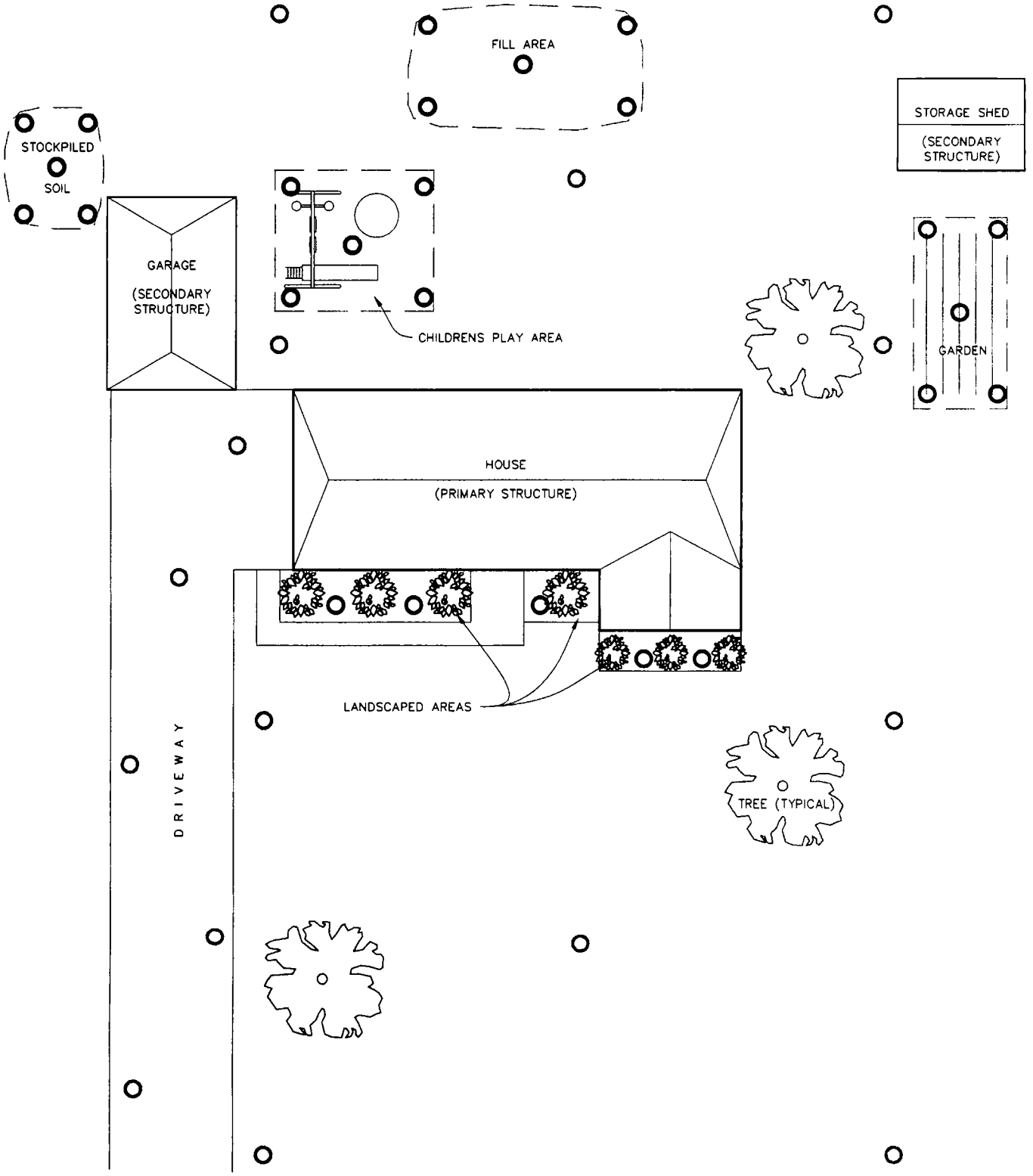
N

CDM

Color Chart(s)

The following pages contain color that does not appear in the scanned images.

To view the actual images, please contact the Superfund Records Center at (303) 312-6473.



NOT TO SCALE

LEGEND

- FRONT YARD SAMPLE (0-1)
- BACK YARD SAMPLE (0-1)
- LANDSCAPED AREA SAMPLE (0-6)
- GARDEN SAMPLE (0-6)
- OPPORTUNITY SAMPLE (0-6)

Figure 3-2

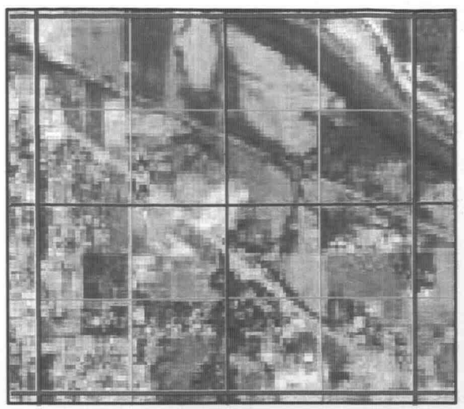
Example Sampling Locations and Property Site Layout

Libby Asbestos Project
Libby, Montana

CDM

T:\CADD\LIBBYSITE.dwg 03/27/02

Detail View



Contaminant Screening Grid Tiles

Libby, Montana

Figure 3-3

Contaminent Screening Study Boundary
Grid
Quadrant
Section

1 0 1 2 Miles

N

CDM

Section 4
Field Activity Methods and Procedures

The following is a summary of field activities that will be performed by CDM personnel during the CSS investigation at Libby Montana

- Mobilization/demobilization
- Procurement of equipment supplies, and containers
- Field documentation
- Screening questionnaire
- Soil sample collection
- Equipment decontamination
- Investigation-derived waste containment

The following subsections reference CDM SOPs, where applicable or provide site-specific procedures if there are not applicable SOPs The following SOPs (CDM 2001) and site-specific guidance documents are included in Appendix A

SOP 1-2	Sample Custody (with modifications)
SOP 1-3	Surface Soil Sampling (with modifications)
SOP 2-1	Packaging and Shipping of Environmental Samples (with modifications)
SOP 2-2	Guide to Handling of Investigation-Derived Waste (with modifications)
SOP 4-1	Field Logbook Content and Control
SOP 4-2	Photographic Documentation of Field Activities (with modifications)
SOP 4-5	Field Equipment Decontamination at Nonradioactive Sites (with modifications)

In addition, the following alternative SOPs will be used during the CSS investigation

Project-Specific SOP	Data Validation of Asbestos Results Obtained by Reflectance Spectroscopy
Project-Specific SOP	Data Validation of Asbestos Results Obtained by Scanning Electron Microscopy
EPA SOP ISSI-LIBBY-01	Soil Sample Preparation

Two site-specific guidance documents have been developed to standardize the completion of field forms These guidance documents are included in Appendix A

Site-Specific Guidance	Completion of Field Sample Data Sheets
Site-Specific Guidance	Completion of Information Field Forms

The HASP is included in Appendix B

4 1 Mobilization/Demobilization

CDM has been supporting the ERB activities in Libby since 1999 and currently leases office space at 404 Highway 2 West in Libby As a result the majority of mobilization activities associated with initial setup are complete However, start-up activities for this sampling season will need to take place

CDM will identify and provide all necessary personnel equipment and materials for the purpose of conducting the CSS investigation A complete inventory of available equipment and supplies will be conducted prior to initiating the field activities and any additional required equipment or supplies will be obtained

Prior to the mobilization for field activities a field-planning meeting will be conducted by the CDM onsite manager and attended by the CDM project manager available field staff health and safety officer (HSO) and a member of the QA staff The CDM onsite manager will notify a member of the QA staff and a HSO of the agenda before the meeting The agenda will be reviewed and approved by the QA staff and the HSO prior to the meeting In addition daily field planning meetings at the CDM Libby office conducted by the CDM onsite manager and attended by the current field staff The participants at all meetings will sign an attendance list The field-planning meeting will discuss and clarify

- Objectives and scope of the field work
- Equipment and training needs
- Number and types of samples and analyses
- Field operating procedures schedule of events and individual assignments
- Required QC measures
- Safety issues
- Documents governing field work that must be on site
- Community relations
- Interactions with the media
- Any changes in the field planning documents

Additional meetings will be held when the documents governing field work require it or when the scope of the assignment changes significantly

Daily field planning meetings will discuss the previous days events and planned activities for the current day Any changes to project procedures schedules, or other pertinent project updates will be discussed New field team members will be introduced and assigned to work with an experienced team member

Copies of the field-planning meeting agenda daily field planning meeting notes and meeting attendance lists will be distributed to the project files by the CDM project manager

4 2 Equipment, Supplies, and Containers

CDM has identified the equipment and supplies necessary to support the CSS field activities These items are summarized in Table 4-1 CDM will provide all sampling equipment used to collect and contain samples for analyses A list of required sample containers are included in Table 4-2

4 3 Field Documentation

Detailed sampling notes will be recorded for each sample in accordance with CDM SOP 4-1, Field Logbook Content and Control Photographic documentation will be recorded for each site in accordance with CDM SOP 4-2 Photographic Documentation of Field Activities FSDSs will be completed for each site in accordance with the CDM project-specific SOP, Completion of Field Sample Data Sheets An example FSDS is included in Appendix A

4 4 Screening Questionnaire

An IFF screening questionnaire will be completed for each structure within a property boundary, as described in Section 3 3 3 1 Information will be obtained from the property owner and occupant (if different) All IFFs will be completed in accordance with the CDM project-specific SOP, Completion of Property Information Field Form An example IFF is included in Appendix A

4 5 Soil Sampling

The procedures presented in this section are brief summaries of the referenced SOPs and provide additional site-specific detail that may not be discussed in the individual SOPs For additional information CDM field personnel will refer to the SOPs included in Appendix A The HASP should be consulted to determine the health and safety protocol for performing specific activities

Soil samples will be collected from specific land use areas as described in Section 3 3 3 2 All soil samples will be collected in accordance with CDM SOP 1-3, Surface Soil Sampling with modifications The following modifications to SOP 1-3 have been reviewed and approved

Section 2 2, Discussion - Sample depths for surface soil samples will generally be 0 to 1 inch for yard (i e grassy area) and 0 to 6 inches for disturbed areas (i e garden landscaping area) Composite samples will be composed of nearly equal portions of soil from up to five randomly discrete locations within a land use area

Section 4 0, Required Equipment - Neither ice bags nor blue ice will be used Since the sampling is for asbestos rather than metals or organic compounds the use of stainless steel or Teflon®-lined sampling instruments is determined not to be necessary The sampler may be a garden bulb planter trowel or other similar device In addition, plastic sheeting is not necessary during sampling

Section 5 2 3, Method for Collecting Samples for Nonvolatile Organic or Inorganic Compound Analysis - Quart-sized zip-top bags will be used as sample containers The zip-top bags will be filled approximately 1/3 full with soil (approximately 100 grams [g]) The sample index identification (ID) sticker will be affixed to the inside of the bag and the index ID number will be written on the outside of the bag with an indelible marker The sample will then be double bagged with the same information recorded on the outer bag Further preparation (i e drying splitting) will be performed at the designated laboratory

4 5 1 Sample Preparation

All soil samples will be shipped to the designated laboratory for further preparation (i e , drying, splitting, archiving, etc) in accordance with EPA SOP ISSI-LIBBY-01 (Appendix A) Prepared samples will be shipped to the specified laboratory for analysis

4 5 2 Rinsate Samples

Soil samples will be collected using non-disposable equipment (i e trowels bowels spoons etc) In accordance with EPA directions, one rinsate sample per day will be collected during the first week of the CSS study to identify any potential cross contamination between samples If analysis reveals evidence of cross contamination risnsate samples will be collected for the duration of the CSS After equipment has been decontaminated (Section 4 6) American Society for Testing and Materials (ASTM) Type II water will be used to collect the rinsate sample A list of required rinsate sample containers and sample volume is indicated on Table 4-2

4 6 Equipment Decontamination

Equipment used to collect, handle or measure soil samples will be decontaminated in accordance with CDM SOP 4-5, Field Equipment Decontamination at Nonradioactive sites with modifications The following modifications to SOP 4-5 have been reviewed and approved

Section 4 0, Required Equipment - Plastic sheeting will not be used during decontamination procedures ASTM Type II water will not be used Rather, locally available deionized water (DI) water will be used

Section 5 0, Procedures - Decontamination water will not be captured and will be discharged to the ground at the property

Section 5 6, Waste Disposal - Decontamination water will not be captured and will not be packaged, labeled, or stored as investigation-derived waste (IDW)

4 7 Investigation-Derived Waste

IDW at each property will consist of excess sample volume, spent decontamination supplies, and personal protective equipment (PPE) All IDW will be handled in accordance with CDM SOP 2-2 Guide to Handling IDW with modifications The following modifications to SOP 2-2 have been reviewed and approved

Section 5 2, Offsite Disposal - All spent sampling IDW (i e paper towels, respirator cartridges, etc) will be collected in transparent garbage bags and marked IDW with an indelible marker These bags will be deposited into the asbestos contaminated waste stream for disposal

Table 4 1 Sampling Supply and Equipment Checklist

General	
SAP	Alconox (4 pound box)
Access agreement forms (completed and blank)	Water sprayer
Information field forms (screening questionnaire)	Scrubbing brush (2)
Field logbook	De ionized water (2 gallons)
FSDS	1 liter HDPE containers
Chain of custody (COC) forms	Aluminum foil
Sheets of index IDs	Paper towels
Sheets of location IDs	Measuring tape
GPS unit	Tape clear duct and strapping
Digital camera	Ice chests (2)
Trowel or bulb planter	Garbage bags (transparent)
Mixing bowl/Spoons	Ladder
Zip top plastic bags (quart size)	Flashlight
Indelible markers and pens (Sharpie extra fine)	Information flyer (to be left with property owner)
Decon buckets 5 gallon	Clipboards
Health and Safety	
First aid kit	Steel toed boots
Tyvek coveralls	Gloves cotton and nitrile
Respirator and cartridges (see HASP)	Respirator cleaning wipes
Safety glasses	Cellular telephone/radio
Fire extinguisher	

Table 4 2 Sample Containers

Soil Samples			
Container	**Size**	**Quantity**	**Required Volume**
Zip top plastic bags	Quart	1 per sample	100 g
Rinsate Samples*			
Container	**Size**	**Quantity**	**Required Volume**
HDPE Container (wide mouth)	1 L	2 per sample	800 ml

Rinsate samples will only be collected during the first week of the CSS investigation at a rate of one per day Additional rinsate samples may be collected pending results of the initial rinsate samples

Acronyms

g	grams
HDPE	high density polyethylene
L	liter
ml	milliliters

Part 2 Quality Assurance Project Plan

This page intentionally left blank

Section 5
Project Management and Data Quality Objectives

Sections 5 through 8 of this SAP constitute the QAPP (Part 2 of the SAP) The QAPP for the CSS has been developed in accordance with EPA QA/R-5 guidance for preparing QAPPs (EPA 2001) This section covers the project management including the project organization background and purpose project description quality objectives and criteria, special training, and documentation and records Appendix B includes all of the applicable SOPs with site modifications

5 1 Project Organization

Organization and responsibilities specific to this investigation are discussed in this section CDM will provide the necessary technical staff to perform sampling and reporting aspects of the project Laboratory services will be provided by a CDM-contracted laboratory

5 1 1 EPA Management

The EPA RPM, Mr Jim Christiansen, is CDM s primary contact for coordinating work at the Libby Asbestos Site Mr Christiansen is responsible for

- Defining the scope of the CSS
- Defining data quality objectives
- Selecting CSS team and contractors
- Reviewing all project deliverables
- Maintaining communications with the CDM project manager for updates on the status of the CSS activities
- Reviewing monthly status reports
- Providing oversight of the CSS
- Ensuring that plans are implemented according to schedule
- Reviewing work progress for each task to ensure that budgets and schedules are met
- Reviewing and analyzing overall performance with respect to goals and objectives
- Reviewing analytical results
- Using data collected during the CSS for remediation decision-making

5 1 2 CDM Management

The CDM management team will be comprised of the following positions project manager RAC project manager, onsite manager health and safety coordinator field health and safety coordinator, sample coordinator laboratory coordinator, CSS task leader, and sampling team leaders Figure 5-1 represents the CDM management organizational chart Figure 5-2 represents the personnel responsible for each step of the CSS process as outlined in Section 3 Figures 5-3 through 5-6 present the responsibilities of each CSS team member specific to the CSS process

The CDM project manager for overall work at the Libby Asbestos Site is Tim Wall Mr Wall, as project manager, is responsible for the overall management and coordination of the following activities

- Maintaining communication with the Volpe Center regarding the overall status of the Libby Asbestos Project
- Preparing status reports for the Volpe Center
- Supervising production and review of deliverables for the Volpe Center
- Overseeing CSS activities as implemented through the Volpe Center
- Tracking overall budgets and schedules
- If applicable notifying the responsible QA staff immediately of significant problems affecting the quality of data or the ability to meet project objectives
- Procuring laboratory subcontracts

The CDM remedial project manager is Jeff Montera Mr Montera as the remedial project manager, is responsible for the management and coordination of the following activities as associated with the remedial project

- Maintaining communication with EPA Region VIII regarding the status of the CSS
- Preparing status reports for EPA Region VIII
- Supervising production and review of deliverables for EPA Region VIII
- Tracking EPA Region VIII RAC budgets and schedules
- If applicable, notifying the responsible QA staff immediately of significant problems affecting the quality of data or the ability to meet project objectives
- Incorporating and informing EPA and Volpe of changes in the work plan SAP, HASP QAPP, and/or other project documents associated with the CSS

The CDM onsite manger is David Schroeder Mr Schroeder as the onsite manager is responsible for the management and coordination of the following activities

- Maintaining communication with Mr Wall Mr Montera, and the onsite representative from the Volpe Center concerning the daily activities of the CSS
- Coordinating daily work activities
- Scheduling personnel and material resources needed to complete the CSS
- If necessary identifying problems resolving difficulties in consultation with EPA Volpe, and CDM staff
- Ensuring field aspects of the investigation, including this QAPP, SAP, and other project documents, are implemented by the CSS task leader
- Organizing and conducting daily meetings with onsite personnel
- Implementing and documenting corrective action procedures at the team level
- Providing communication between the sampling team and project management
- Preparing daily reports regarding field activities for the onsite Volpe representative

The CDM health and safety coordinator for the Libby Asbestos Site is responsible for the following

- Ensuring all work will be conducted in accordance with the site-specific HASP that governs the field work outlined in this SAP

The CDM field health and safety officer for the Libby Asbestos Site is responsible for the following

- Ensuring that the protocols specified in the HASP are carried out during field activities
- Ensuring that copies of the HASP and CDM health and safety manual are maintained at the site at all times
- Upgrading or downgrading levels of protection in accordance with the HASP, based on existing site conditions
- Conducting an initial health and safety meeting for all personnel

- Providing an overview of the HASP to all assigned field personnel and having them sign a form to indicate they understand the content of the HASP document and will adhere to its specifications
- Contacting the health and safety coordinator if any questions or issues arise during field activities

The CDM sample coordinator for the Libby Asbestos Site is responsible for the following

- Maintaining all field paper work
- Informing the laboratory and the laboratory coordinator of the number of samples shipped to the laboratory
- Shipping samples to the laboratory
- Ensuring all samples are maintained within proper COC requirements
- Coordinating data entry requirements related to field forms
- Providing data results to EPA via data requests
- Ensuring all paper work is received by the appropriate CDM office for document control files as described in Section 6 10

The CDM laboratory coordinator for the Libby Asbestos project is responsible for the following

- Ensuring sample load can be meet by subcontracted laboratories
- Tracking samples through the analysis process to ensure all results are returned within the appropriate turn around time
- Determining SEM/IR split samples from IR results and ensuring IR samples are sent for SEM analysis based on the frequency discussed in Table 5-1
- Ensuring all original data packages are sent to the CDM Helena, Montana office for filing and a copy of each data package related to the CSS is sent to the CDM office in Denver Colorado

The CDM CSS task leader for the Libby Asbestos project is responsible for the following

- Ensuring that all sample team members are trained in proper sample collection and field documentation as described in this SAP

- Coordinating with community relations personnel to ensure that access agreements are completed prior to sampling of a property
- Maintaining proper supplies necessary for each sampling team
- Performing QC checks of field team documentation and a 2 percent check of field observations
- Coordinating with the onsite manager regarding the daily activities of the CSS
- Implementing field aspects of the investigation, including this QAPP, SAP, and other project documents
- Conducting orientation training for all field team members

The CDM team leader for each sampling group is responsible for the following

- Ensuring that sampling is conducted in accordance with pertinent CDM SOPs and that the quantity and location of the samples meet the requirements of this SAP
- Maintaining proper chain-of-custody forms and sample labels for proper transfer of the samples to the sample coordinator
- Properly completing all field paper work as specified in CDM site-specific SOPs

5 1 3 Quality Assurance Organization

CDM s QA manager, Ms RoseMary Gustin, implements the QA program The QA manager is independent of the technical staff and reports directly to the president of CDM on QA matters The QA manager, thus, has the authority to objectively review projects and identify problems and the authority to use corporate resources as necessary to resolve any quality quality-related problems

The QA coordinator for this project, Ms Krista Lippoldt, and the regional QA specialist, Mr George DeLullo, report to the QA manager on QA matters Under the oversight of the QA manager, they are responsible for the following

- Verifying that corrective actions resulting from staff observations, QA/QC surveillances, and/or QA audits are implemented
- Reviewing and approving the project-specific plans
- Directing the overall project QA program
- Maintaining QA oversight of the project
- Reviewing QA sections in project reports, as applicable

- Reviewing QA/QC procedures applicable to this project
- Auditing selected activities of this project performed by CDM and subcontractors, as necessary
- Initiating, reviewing and following up on response actions as necessary
- Maintaining awareness of active projects and their QA/QC needs
- Consulting with the CDM QA manager as needed on appropriate QA/QC measures and corrective actions
- Conducting internal system audits to check on the use of appropriate QA/QC measures, if applicable
- Arranging performance audits of measurement activities, as necessary
- Providing monthly written reports on QA/QC activity to the CDM QA manger

5 1 4 Report Organization

This QAPP is organized in accordance with EPA Requirements for QAPPs EPA QA/R-5 Final March 2001 (EPA 2001) Section 5 presents project management and introductory information Section 6 provides guidance for measurement and data acquisition Section 7 details assessment and oversight aspects of the project Section 8 describes data validation and usability issues, and Section 9 provides references

5 2 Background and Purpose

Site background and information is provided in Section 2 of this SAP The purpose and objectives of the CSS are discussed in Section 1 1 of this SAP The purpose of this QAPP is to provide guidance to ensure that all environmentally-related data collection procedures and measurements are scientifically sound and of known acceptable, and documented quality and conducted in accordance with the requirements of the project

5 3 Project Description

A description of this project is provided in Section 1 of this SAP Samples collected during the screening study will be analyzed for LAA by the methods listed in Section 5 4 Sampling activities and all associated procedures are described in detail in Sections 3 and 4 of this SAP

5 4 Quality Objective and Criteria for Measurement

This section provides internal means for control and review of the project so that environmentally related measurements and data collected are of known and

acceptable quality The subsections below describe the DQOs (Section 5 4 1) and data measurement objectives (Section 5 4 2)

5 4 1 Data Quality Objectives

The DQO process is a series of planning steps based on the scientific methods that are designed to ensure that the type quantity, and quality of environmental data used in decision-making are appropriate for the intended purpose The EPA has issued guidelines to help data users develop site-specific DQOs (EPA 2000b) The DQO process is intended to

- Clarify the study objective
- Define the most appropriate type of data to collect
- Determine the most appropriate conditions from which to collect the data
- Specify acceptable levels of decision errors that will be used as the basis for establishing the quantity and quality of data needed to support remedial design

The goal of the DQO process is to help assure that data of sufficient quality are obtained to support remedial response decisions, reduce overall costs of data sampling and analysis activities and accelerate project planning and implementation

The DQO process specifies project decisions, the data quality required to support those decisions, specific data types needed, data collection requirements, and analytical techniques necessary to generate the specified data quality The process also ensures that the resources required to generate the data are justified The DQO process consists of seven steps, and the output from each step influences the choices that will be made later in the process These steps include

Step 1 State the problem
Step 2 Identify the decision
Step 3 Identify the inputs to the decision
Step 4 Define the boundaries of the investigation
Step 5 Develop a decision rule
Step 6 Specify tolerable limits on decision errors
Step 7 Optimize the design for obtaining data

During the first six steps of the process, the planning team develops decision-performance criteria (i e , DQOs) that will be used to develop the data collection design The final step of the process involves developing the data collection design based on the DQOs A brief discussion of these steps and their application to this project is provided below

5 4 1 1 Step 1 State the Problem

The purpose of this step is to describe the problem to be studied so that the focus of the study will be unambiguous The conceptual site model of the environmental hazards of the Libby Asbestos Site is included as Figure 5-7 The exposure pathways that will be targeted for investigation during the CSS are both inhalation and ingestion pathways LAA present in the vermiculite mined at the mine site is present in the study area, but specific areas of contamination are not known The purpose of this investigation is to determine the presence or absence of potential LAA sources at each property within the study area This screening study will support remedial decisions on a property-by-property basis Results will also be analyzed to determine if any pattern of contamination exists (i e aerial dispersion) This study is conducted through a combination of verbal and visual screening, as well as, a presence or absence of analytical technique All properties in the study area will be screened for the presence of primary and secondary sources of LAA Composite soil samples will be collected from each property and will be analyzed for the presence of LAA by either IR or SEM methods

The planning team members include Jim Christiansen Mary Goldade and Chr s Weis of EPA John McGuiggin of the Volpe Center and Tim Wall David Schroeder Darwin Nelson and Jeff Montera of CDM The decision maker is Jim Christiansen All personnel conducting the field work associated with this screening study will be from CDM Budget and schedule related to the project as discussed in the work plan (CDM 2002)

5 4 1 2 Step 2 Identify the Decision

This step identifies what question the investigation will attempt to resolve and what actions may result The principal study question is

Is the presence or absence of potential LAA sources known for each property in the study area?

The decision statement is whether or not the presence or absence of potential LAA sources is known for each property in the study area Possible outcomes of the CSS and likely cleanup decisions are described below and based solely on EPA decisions supported by investigation results on the sources of LAA observed at a property during the CSS

- Outcome Property with ZAI (past or present), which has source materials outdoors and other areas of detectable LAA outdoors

  Cleanup decision No further indoor sampling Clean up ZAI interior and outside source materials Remediation of other areas of detectable asbestos outdoors may occur or require risk assessment and/or additional sampling

- Outcome Property with ZAI (past or present), which has source materials outdoors but no other areas of detectable LAA outdoors

  Cleanup decision No further sampling or risk assessment Clean up ZAI, interior and outside source materials

- Outcome Property with ZAI (past or present), which has no source materials outdoors but does have other areas of detectable LAA outdoors

  Cleanup decision No further sampling indoors Clean up ZAI and interior Remediation of other areas of detectable LAA outdoors may occur or require risk assessment and/or additional sampling

- Outcome Property with ZAI (past or present), which has no detectable LAA outdoors

  Cleanup decision No further sampling or risk assessment Clean up ZAI and interior

- Outcome Property without ZAI, which has source materials outdoors and other areas of detectable LAA

  Cleanup decision Clean up source materials Remediation of interior may occur or require risk assessment and/or indoor dust sampling Remediation of other areas of detectable LAA outdoors may occur or require risk assessment and/or additional sampling

- Outcome Property without ZAI, which has no source materials outdoors but does have other areas of detectable LAA outdoors

  Cleanup decision Remediation of interior may occur or require risk assessment and/or indoor dust sampling Remediation of other areas of detectable LAA may occur or require risk assessment and/or additional sampling

- Outcome Property without ZAI, no detectable LAA outdoors but does have mining history, a past or current resident with an asbestos-related disease, or other reason to believe indoor dust may be contaminated with LAA

  Cleanup decision Remediation of interior may occur or require risk assessment and/or indoor dust sampling

- Outcome Property without ZAI, which has no detectable LAA outdoors and no mining history or other reason to believe dust may be contaminated with LAA

  Cleanup decision No action

- Outcome Property with vermiculite additives in building materials

Cleanup decision Any remediation or additional sampling and/or risk assessment will be evaluated on a case-by-case basis

5 4 1 3 Step 3 Identify the Inputs to the Decision

The purpose of this step is to identify the information that needs to be obtained and the measurements that need to be taken to resolve the decision statements The information required to resolve the decision statement consists of the following

- Visual confirmation of the presence or absence of ZAI at each property in the study area
- Visual confirmation of the presence or absence of primary outdoor sources of LAA at each property in the study area
- Verbal confirmation of the presence or absence of other potential LAA contamination sources (i e , mining history, past presence of ZAI past or present occupants with an asbestos-related disease) at each property in the study area
- Verbal and/or visual confirmation of the presence of Libby vermiculite used as additives in building materials at each property in the study area
- Concentration of LAA in soil samples collected from properties in the study area

The sources of this information are observations in the field and laboratory analysis of samples collected during this investigation There is no action level for this study because the principal study question is to determine the presence or absence of LAA Any detection at or above the reporting limit confirms the presence of LAA in soils The collection and analysis of dust samples may be performed but will be determined on a case-by-case basis If analytical results for dust samples are available this information will also be included to help resolve the decision statements

5 4 1 4 Step 4 Define the Boundaries of the Study

This step identifies the target population of interest and specifies the spatial and temporal boundaries of this investigation

The target populations of interest with regards to the principal study question are potential sources of LAA contamination inside and outside homes and small commercial buildings in the Libby study area

The spatial boundary of the investigation includes any structure within the study area boundary (Figure 3-1) and the surface soils (0 to 6 inches in disturbed areas, 0 to 1 inch in non-disturbed areas) at each property

The temporal boundaries include the time frame from when mining activities began at the mine site through the time of visual inspection and/or sampling at a property

Physical constraints that may interfere with sample collection or visual confirmation of potential sources of LAA may include, but are not limited to, inclement weather conditions (i e snow covered ground frozen soils overcast skies etc) and access to attics or wall cavities Overcast skies reduce the visibility of phyllosicilcates (unexpanded vermiculite), snow prevents outdoor visual confirmation, and frozen soils limit composite soil sample homogenization

5 4 1 5 Step 5 Develop a Decision Rule

The purpose of this step is to define the parameter of interest, specify the action level, and integrate previous DQO outputs into a single statement that describes a logical basis for choosing among alternative actions

The parameters of interest are visual and verbal confirmation of potential sources of LAA present at all properties within the study area, as well as analytical results of soil samples The results of visual and verbal confirmation and each analytical analysis result will determine if the principal study question has been answered

The analytical methods used for soil analysis (IR or SEM) will be used to determine the presence or absence of LAA If the presence of LAA is confirmed by sample analysis or by visual and verbal confirmation, additional action may be required

Because there is no action level for this study, the detection limits were set a values below an action level previously used at the Libby Asbestos Site (1 percent)

5 4 1 6 Step 6 Specify Tolerable Limits on Decision Errors

Decision makers tolerable limits on decision errors, which are used to establish performance goals for the data collection design, are specified in this step Decision makers are interested in knowing the true value of LAA present in soil samples submitted for analysis and the presence or absence of potential sources of LAA at each property in the study area Since analytical methods can only estimate values and visual and verbal confirmation can be in error decisions based on this information could be in error (decision error) There are two reasons why the decision makers may not know whether or not potential LAA sources are present at each property in the study area

- **Sample design error** Sampling design error occurs when the sampling design is unable to capture the complete extent of natural variability that exists in the true state of the environment Concentrations may vary over time and space Limited sampling or visual inspection may miss some features of this natural variation because it is usually impossible or impractical to measure every point of a population

- **Measurement error** Measurement error refers to a combination of random and systematic errors that inevitably arise during the various steps to the measurement process Analytical methods and instruments are never absolutely

perfect hence a measurement can only estimate the true value of an environmental sample

The combination of sampling design error and measurement error is the total study error Since it is impossible to completely eliminate total study error basing decisions on sample concentrations and field observations may lead to a decision error The probability of decision error is controlled by adopting a scientific approach to select between one condition (the null hypothesis) and another (the alternative hypothesis) The null hypothesis is presumed to be true (not rejected) in the absence of evidence to the contrary For this project, the null hypothesis is that the presence or absence of LAA at each property in the study area is known The alternative hypothesis is that the presence or absence of LAA at each property in the study area is not known

A false positive or Type I decision error refers to the type of error made when the null hypothesis is rejected when it is true and a false or negative, or Type II decision error refers to the type of error made when the null hypothesis is not rejected when it is not true For this project, a Type I decision error would result in deciding that the presence or absence of LAA is not known when it is A Type II decision error would result in deciding that the presence or absence is known when it is not which may cause incorrect decisions to be made For this project, a Type II error is less acceptable than a Type I error because a Type II error could result in human harm whereas a Type I error could result in spending money for further investigation or remediation of a clean property

The analytical techniques for asbestos soil analysis utilized during this investigation will be used to determine the presence or absence of LAA in soils As such any sample results above the reporting limit will confirm the presence of LAA and any nondetects will be used to determine the absence of LAA No gray area or tolerable decision error limits have been established

5 4 1 7 Step 7 Optimize the Design for Obtaining Data

This step identifies a resource-effective data collection design for generating data that are expected to satisfy the DQOs The data collection design (screening and sampling program) is described in detail in the FSP Part I of this SAP

5 4 2 Data Measurement Objectives

Every reasonable attempt will be made to obtain a complete set of usable field measurements and analytical data If a measurement cannot be obtained or is rejected for any reason the CDM project manger and CDM QA staff will evaluate the effect of the missing data This evaluation will be reported to EPA with a proposed corrective action as described in Section 7

5 4 2 1 Quality Assurance Guidance

The field QA program has been designed in accordance with CDM's RAC VIII Quality Management Plan (QMP) (CDM 1996b), CDM s RAC Region VIII QAPP

(CDM 1996a) EPA s Guidance for the DQO Process (EPA 2000b) and the EPA s Requirements for QAPPs for Environmental Data Operations, QA/R-5, Final (EPA 2001) and is discussed in Section 3 4

5 4 2 2 Precision, Accuracy, Representativeness, Completeness, and Comparability Criteria

Precision, accuracy, representativeness, completeness, and comparability (PARCC) parameters are indicators of data quality PARCC goals are established for the CSS soil results to aid in assessing data quality The following paragraphs define the PARCC parameters in conjunction with this project

Precision

The precision of a measurement is an expression of the mutual agreement among individual measurements of the same property taken under prescribed similar conditions Precision is quantitative and most often expressed in terms of relative percent difference (RPD) Comparing the analytical results of the laboratory duplicate sample and its parent sample can assess precision of laboratory analysis The RPD can be calculated for each pair of duplicate analyses using the following equation

$$RPD = |S-D|/[(S+D)/2] \times 100$$

Where

S = First sample value (original value)
D = Second sample value (duplicate value)

Precision of reported results is a function of inherent field-related variability plus laboratory analytical variability, depending on the type of QC samples Field duplicate samples and preparation duplicate samples will be collected to provide a measure of the contribution to overall variability of field-related sources Laboratory duplicate samples, IR/SEM split samples and laboratory split samples will be used to provide a measure of the contribution to overall variability of field-related sources Acceptable RPD limits for laboratory duplicates, IR/SEM split samples, laboratory split samples, field duplicates, and preparation duplicate measurements are included in Table 5-2

Accuracy

Accuracy is the degree of agreement of a measurement with an accepted reference or true value and is a measurement of the bias in a system Analytical data will be evaluated for accuracy using laboratory control samples (LCS) Accuracy criteria are listed in Table 5-2

Representativeness

Representativeness expresses the degree to which sample data represent

- The characteristic being measured

- Parameter variations at the sampling point
- An environmental condition

Representativeness is a qualitative parameter that is most concerned with the proper design of the sample plan and sampling procedures and the absence of sample contamination Acceptable representativeness will be achieved through careful informed selection of sampling sites selection of testing parameters and methods that adequately define and characterize the extent of possible contamination and meet the required parameter reporting limits proper collection and handling of samples to avoid interferences and prevent contamination and loss and collection of a sufficient number of samples to allow characterization Representativeness is a consideration that will be employed during all sample location and collection efforts

The representativeness can be assessed qualitatively by reviewing the procedures and design of the sampling event and quantitatively by reviewing the laboratory blank samples If an analyte is detected in a laboratory blank, any associated positive result less than five times the blank result may be considered undetected

Completeness
Completeness is a measure of the amount of usable data obtained from a measurement system compared to the amount expected to be obtained under correct normal conditions Usability will be determined by evaluation of the PARCC parameters excluding completeness Those data that are evaluated and not rejected are usable Completeness will be calculated following data evaluation A completeness goal of 90 percent is projected for the data set collected for the CSS activities Completeness will be calculated for the combined data from all sampling events performed during the activities of the CSS completeness will not be calculated for individual rounds of sampling If the completeness goal of 90 percent is not met additional sampling may be necessary to adequately achieve project objectives Completeness is calculated using the following equation

$$\% \text{ Completeness} = (DO/DP) \times 100$$

Where

DO = Data obtained and usable
DP = Data planned to be obtained

Comparability
Comparability is a qualitative parameter Consistency in the acquisition handling and analysis of samples is necessary for comparison of results Data developed under this investigation will be collected and analyzed using EPA-approved analytical methods and QC measures to ensure comparability of results with other analyses performed in a similar manner

Sensitivity
Sensitivity, although not a PARCC parameter, will be evaluated for this project The achievement of method detection limits (MDLs) depends on instrument sensitivity and matrix effects Therefore, it is important for the laboratory to monitor the sensitivity of data-gathering instruments to ensure the data quality through constant instrument performance The laboratory, through the analysis of preparation blanks will monitor instrument sensitivity CDM will evaluate sensitivity during the entire project by ensuring that reporting limits are below acceptable criteria Reporting limits are 0 1 percent for IR and SEM and 10 grid counts for rinsate waters by International Organization of Standards (ISO) 10312

5 4 2 3 Field Measurements

Field personnel will record observations regarding the presence or absence of primary and secondary sources of LAA in the field logbooks, FSDS, and IFF GPS coordinates for each sample location and building on a property will be recorded

5 4 2 4 Laboratory Analysis

Analytical methods reporting limits holding times, and QC analyses are discussed below

Laboratories
All soil samples collected in the field will be processed prior to analysis as described in EPA SOP No ISSI-LIBBY-01, Soil Sample Preparation Therefore, these samples will be sent to the CDM laboratory for sample processing, preparation duplicates, split samples, and archive requests The samples will then be sent to an analytical laboratory for analysis

Chain-of-custody procedures will be maintained from sample collection through the processing phase and subsequent shipping to the analytical laboratory Prior to the shipment of any samples for analytical analysis the laboratory coordinator will be contacted to determine the appropriate laboratory that should receive those samples Analytical services for all of the samples will be conducted by one of the following laboratories

EMSL Analytical Inc
107 Haddon Avenue
Westmont, New Jersey 08108
Attn Robert DeMalo
(800) 220-3675 ext 1256

Reservoir Environmental Services, Inc
1827 Grant Street
Denver, Colorado 80203
Attn Jeanne Orr
(303) 964-1986

The laboratory used for all sample analyses will be accredited under the Laboratory Accreditation Program as sponsored by the American Industrial Hygiene Association (AIHA) and participate in the National Institute of Occupational Safety and Health (NIOSH) Proficiency Analytical Testing Program for Laboratory Quality Control for Asbestos

Analytical Methods
Soil samples will be analyzed for LAA by IR or SEM methods listed below

SEM (Asbestos Analysis of Soil by Scanning Microscopy and Energy Dispersive X-Ray Spectroscopy July 11 2000 Revision 0 [EPA 2000c])
IR (ISSI-LIBBY-02)

Rinsate samples following the preparation procedure EPA600/4-84-043 will be analyzed by the transmission electron microscopy (TEM) method ISO 10312

Reporting Limits
The reporting limit for soils analyzed by SEM and IR is 0 1 percent The reporting limit for rinsate samples will be based on a 10-grid count The reporting limits provided are the minimum levels to which the laboratory will report results without a qualifier when LAA are detected

Holding Times
Technical holding times are storage times allowed between sample collection and sample analysis when the designated preservation and storage techniques are employed No preservation requirements or holding times are established for soil samples collected for asbestos analysis

Quality Control Analyses
The types of quality control samples, other than internal laboratory QC samples that will be utilized by CDM for the CSS are discussed below and their acceptable criteria are presented in Table 5-1 A summary of the frequency of the CDM QC sample submission is presented in Table 5-1

For the first 500 samples collected and analyzed by IR, 20 percent of samples with IR results below 0 5 percent will be sent for SEM analysis and 10 percent of samples with IR results greater than 0 5 percent but less than 1 percent will be sent for SEM analysis If the average RPD is less than or equal to 35 percent for theses samples, the frequency of samples sent for both SEM and IR analysis will be dropped to 2 percent for each category If the average RPD is greater than 35 percent, the initial rate of SEM/IR split samples will be continued for the remainder of the CSS

Laboratory split samples will also be analyzed to determine variability of sample analysis between laboratories In this case, the same samples will be analyzed by different laboratories using the same analytical technique Laboratory split samples will be analyzed at a frequency of 2 percent of samples collected This frequency will

be continued for the duration of the CSS After the first 4 weeks of sampling a linear regression will be preformed on the data and an average RPD calculated These calculations will be updated on a weekly basis after the initial 4 weeks and submitted to EPA QA personnel to be evaluated for laboratory performance issues

Field duplicate samples are collected and analyzed to assess the overall precision of the field sample collection These duplicates will be submitted blind to all laboratories by using sample numbers that are different than their associated environmental sample Duplicate soil samples will be collect at a frequency of 1 in 20 (5 percent)

Preparation duplicate samples are splits of samples submitted for sample preparation prior to laboratory analysis These duplicates will be submitted blind to all laboratories by using sample numbers that are different than their associated environmental sample Preparation duplicate soil samples will be submitted at a frequency of 1 in 20 (5 percent) or one per preparation batch, whichever is more frequent

During the first week of sampling, rinsate samples will be collected at the end of each day by a different field team If these results show no asbestos contamination, the collection of field rinsate samples will cease If these results do show the detection of asbestos, rinsate sample collection will continue at the same rate for the duration of the project

5 5 Special Training Requirements

The special training required for this investigation is asbestos awareness respiratory protection training, proper health and safety orientation and site-specific orientation training

5 6 Documentation and Records

Data reports will be submitted to the CDM laboratory coordinator and include a case narrative that briefly describes the number of samples the analyses, and any analytical difficulties or QA/QC issues associated with the submitted samples The data report will also include signed chain-of-custody forms, analytical data, a QC package, and raw data, where applicable All original data reports will be filed in the CDM office in Helena, Montana and a copy filed in the CDM office in Denver, Colorado The laboratory also will provide an electronic copy of the data to the laboratory coordinator and others as directed by CDM

The distribution of all field paper work is discussed in Section 6 10

Table 5-1 Frequency of Collection for CDM QC Samples

QC Sample Type	Collection Frequency	Personnel Responsible for Sample Collection and/or Submission to Laboratory
SEM/IR Splits	First 500 samples collected 20% (1 in 5) of IR results <0 5% 10% (1 in 10) of IR results >0 5% and <1%	Laboratory Coordinator
	If average RPD of samples from first 500 = <35% 2% (1 in 50) of all IR samples	Sample Coordinator
	If average RPD of samples from first 500 = >35% 20% (1 in 5) of IR results <0 5% 10% (1 in 10) of IR results >0 5%	Laboratory Coordinator
Rinsates	First week one at the end of each day	Field Team/Sample Coordinator
	If sample results indicated asbestos at any level rinsates will be collected at the same rate for the duration of the CSS	Field Team/Sample Coordinator
Laboratory Splits	2% (1 in 50)	Laboratory Coordinator
Field Duplicates	5% (1 in 20)	Field Team/Sample Coordinator
Preparation Duplicate	5% (1 in 20) or one per preparation batch	Laboratory Personnel/Sample Coordinator

Table 5-2 Data Evaluation and Validation Criteria

Parameter (Methods)	Technical Holding Time	Calibration Initial	Calibration Continuing	Blanks	LCS	Laboratory Duplicate	SEM/IR Split	Laboratory Split	Field Duplicate	Preparation Duplicate
Asbestos SEM	None	Magnification = +/ 10% Peak Centroid = Al = 1 487 (+/ 0 05) KeV Cu = 8 047 (+/ 0 05) KeV Resolution = <175 eV Sodium Sensitivity = ?	80 120%	Results < 5 x blank contamination	80 120%	If both results >5 x CRDL RPD Solid Media <35% If either result <5 x CRDL Solid Media Difference <2 x CRDL	If both results >5 x CRDL RPD Solid Media <35% If either result <5 x CRDL Solid Media Difference <2 x CRDL	If both results >5 x CRDL RPD Solid Media <35% If either result <5 x CRDL Solid Media Difference <2 x CRDL	If both results >5 x CRDL RPD Solid Media < 50% If either result < 5 x CRDL Solid Media Difference < 4 x CRDL	If both results >5 x CRDL RPD Solid Media < 50 % If either result < 5 x CRDL Solid Media Difference < 4 x CRDL
Asbestos IR	None	Required frequency met	80 120%	Results < 5 x blank contamination	80 120%	If both results >5 x CRDL RPD Solid Media <35% If either result <5 x CRDL Solid Media Difference <2 x CRDL	If both results >5 x CRDL RPD Solid Media <35% If either result <5 x CRDL Solid Media Difference <2 x CRDL	If both results >5 x CRDL RPD Solid Media <35% If either result <5 x CRDL Solid Media Difference <2 x CRDL	If both results >5 x CRDL RPD Solid Media < 50% If either result < 5 x CRDL Solid Media Difference < 4 x CRDL	If both results >5 x CRDL RPD Solid Media < 50% If either result < 5 x CRDL Solid Media Difference < 4 x CRDL

NA = not applicable

CRDL = contract required detection limit

IDL = instrument detection limit

LCS = laboratory control sample

RPD = relative percent difference

KeV = kiloelecton volt

eV= electron volt

SEM = scanning electron microscopy

IR =reflectance spectroscopy

SEM and IR CRDL 0 1%

Figure 5-1 CDM Management Organization Chart

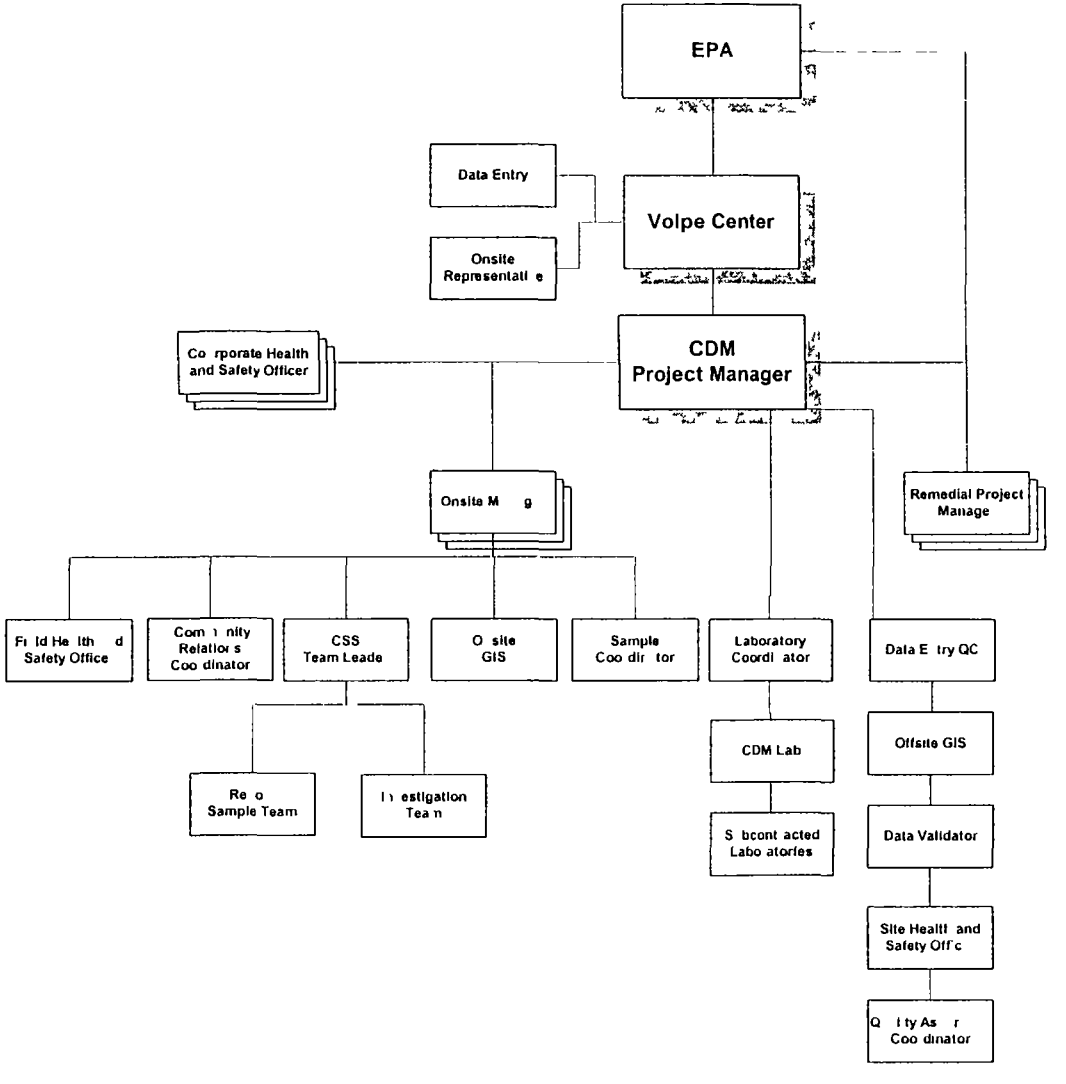


Figure 5-2 CDM Team Members Associated with Each Step of the CSS Process

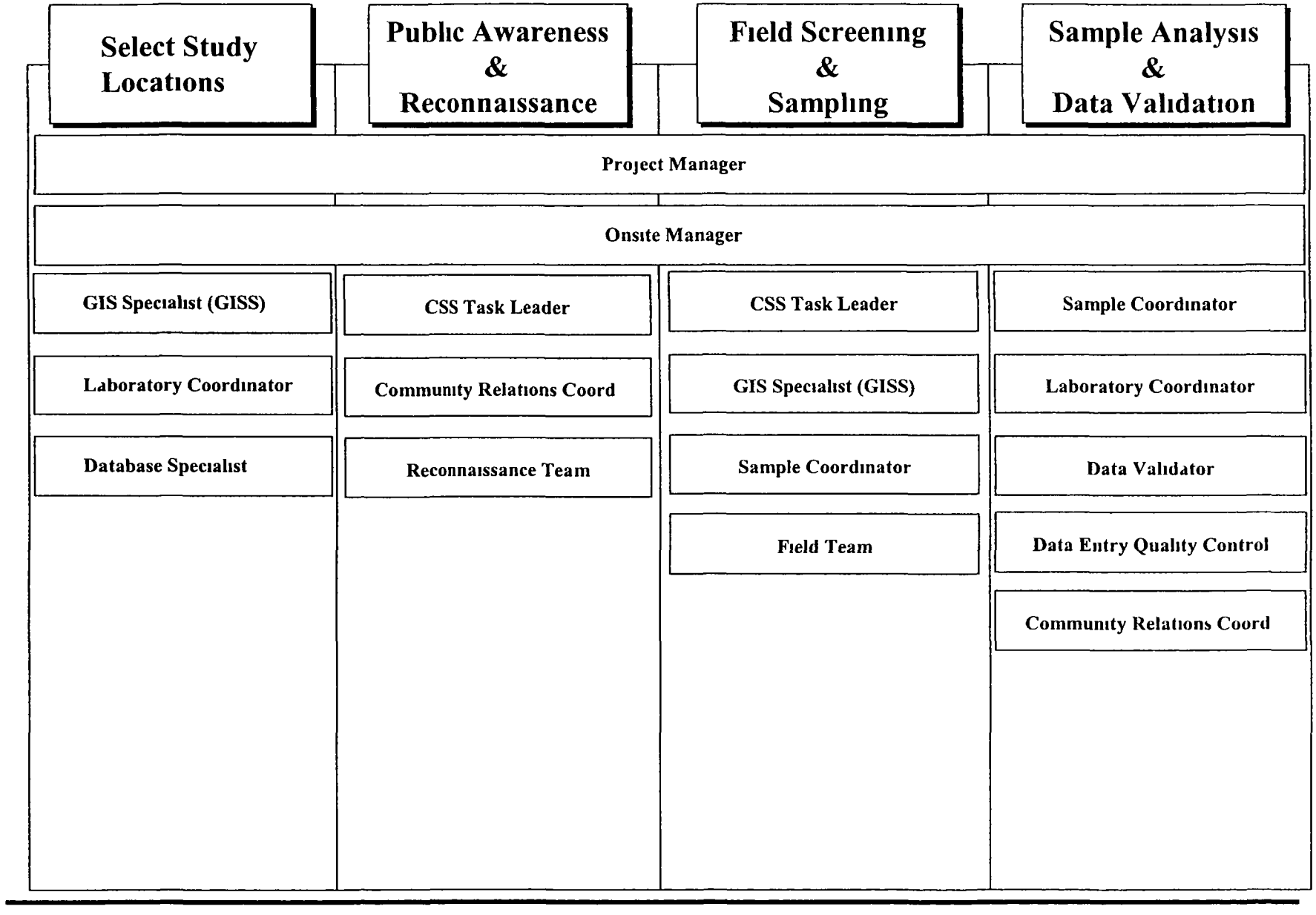


Figure 5-3 Responsibilities by Team Member for Selecting Study Locations

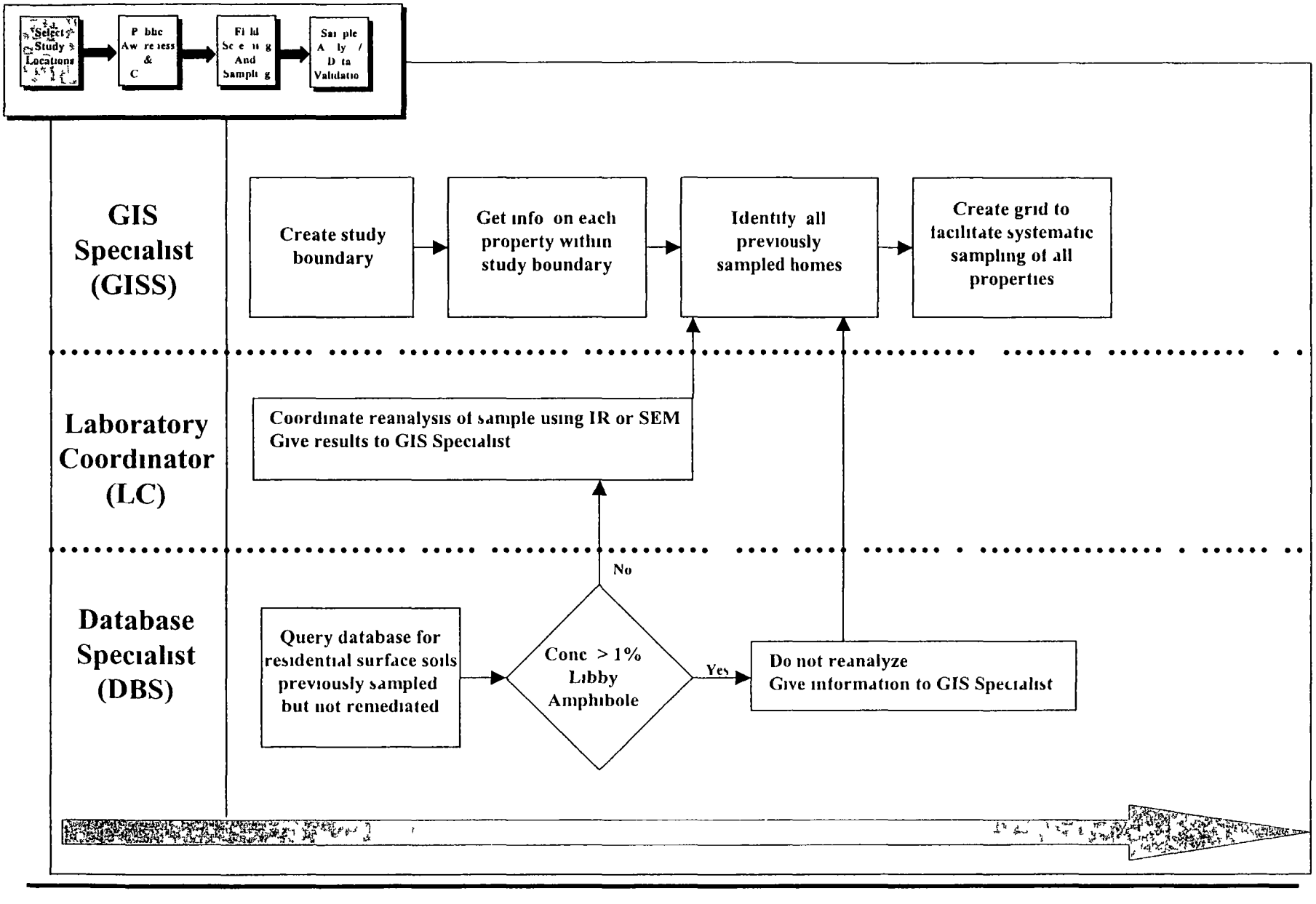


Figure 5-4 Responsibilities by Team Member for Public Awareness and Reconnaissance

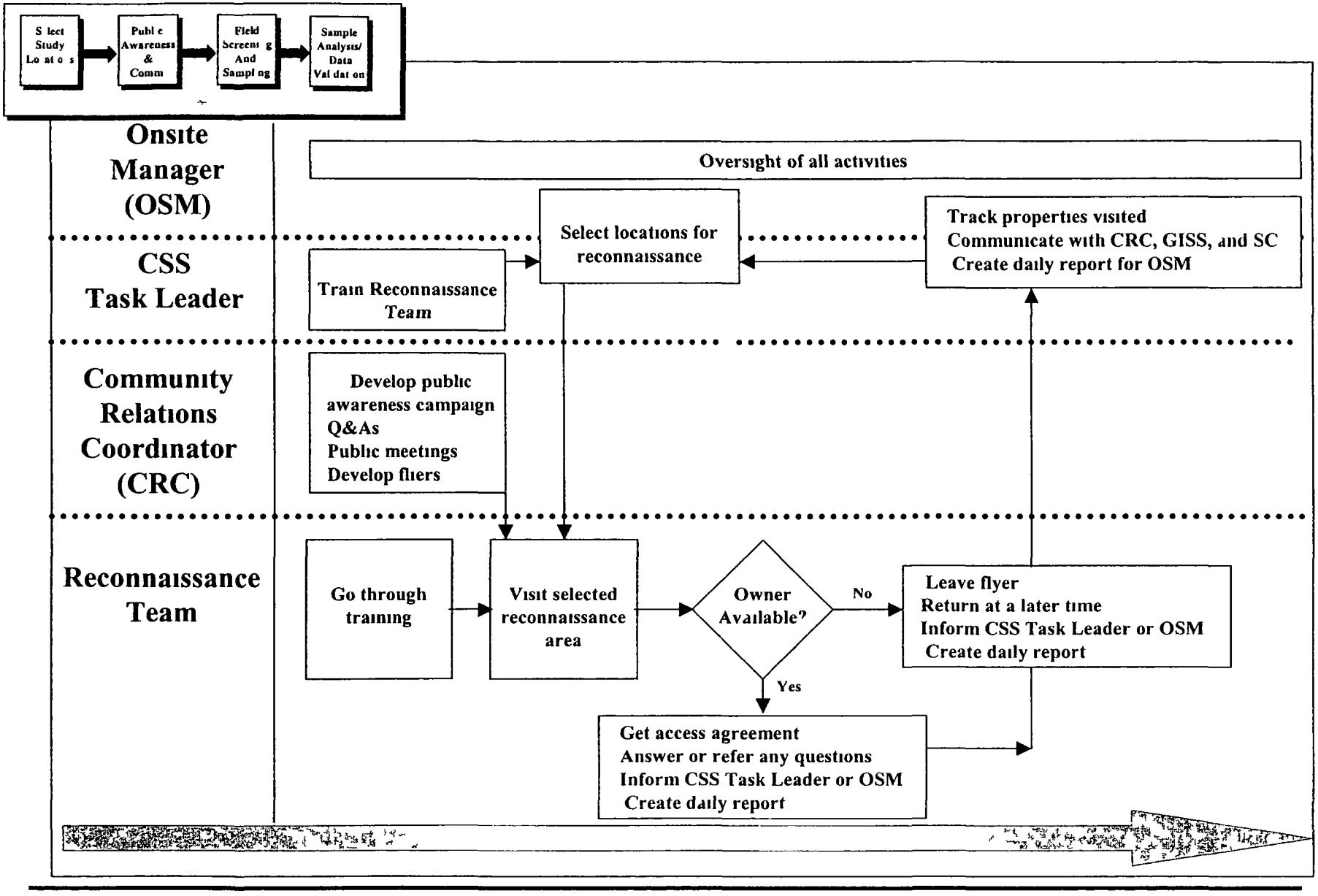


Figure 5-5 Responsibilities by Team Member for Field Screening and Sampling

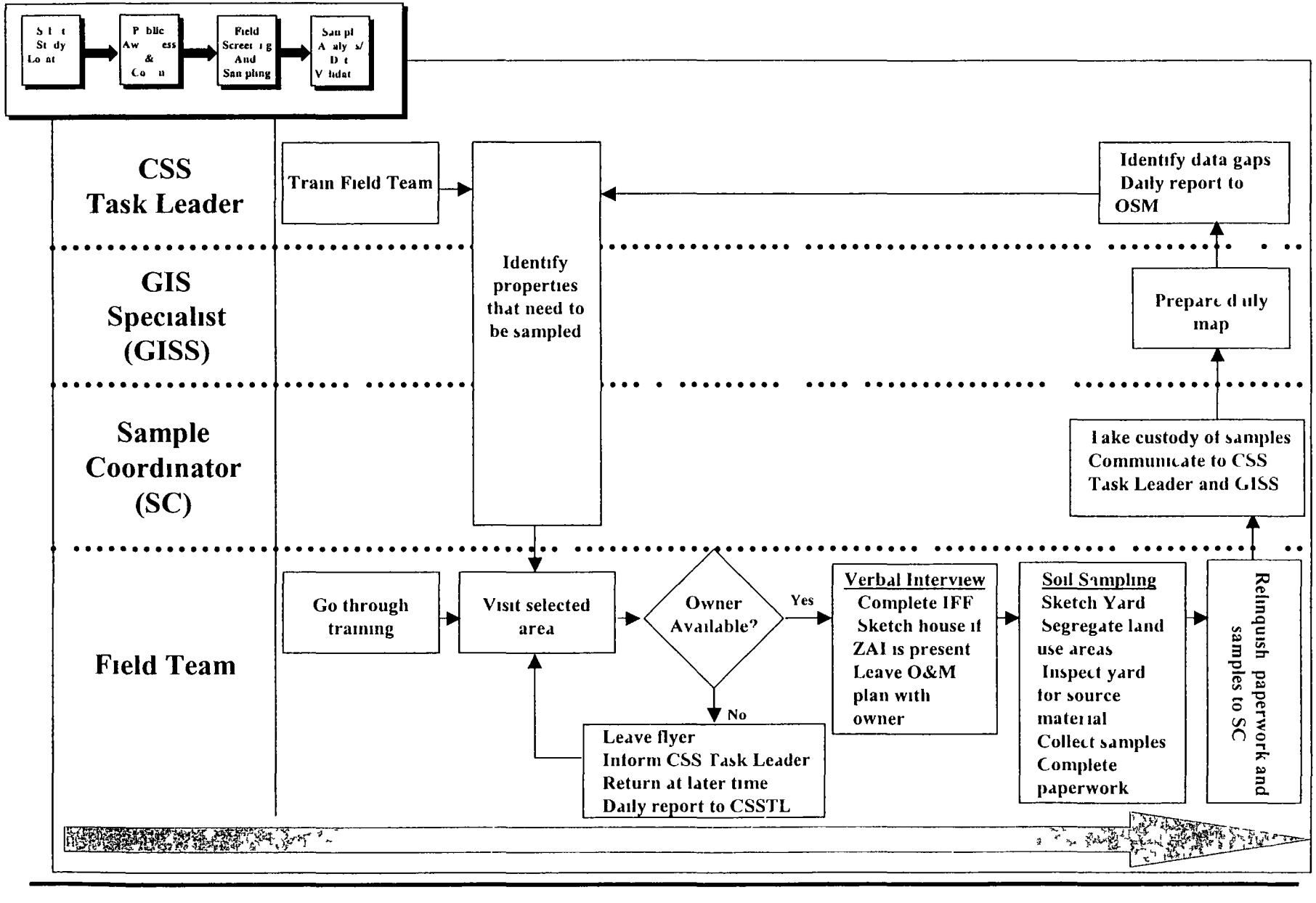


Figure 5-6 Responsibilities by Team Member for Sample Analysis and Data Validation

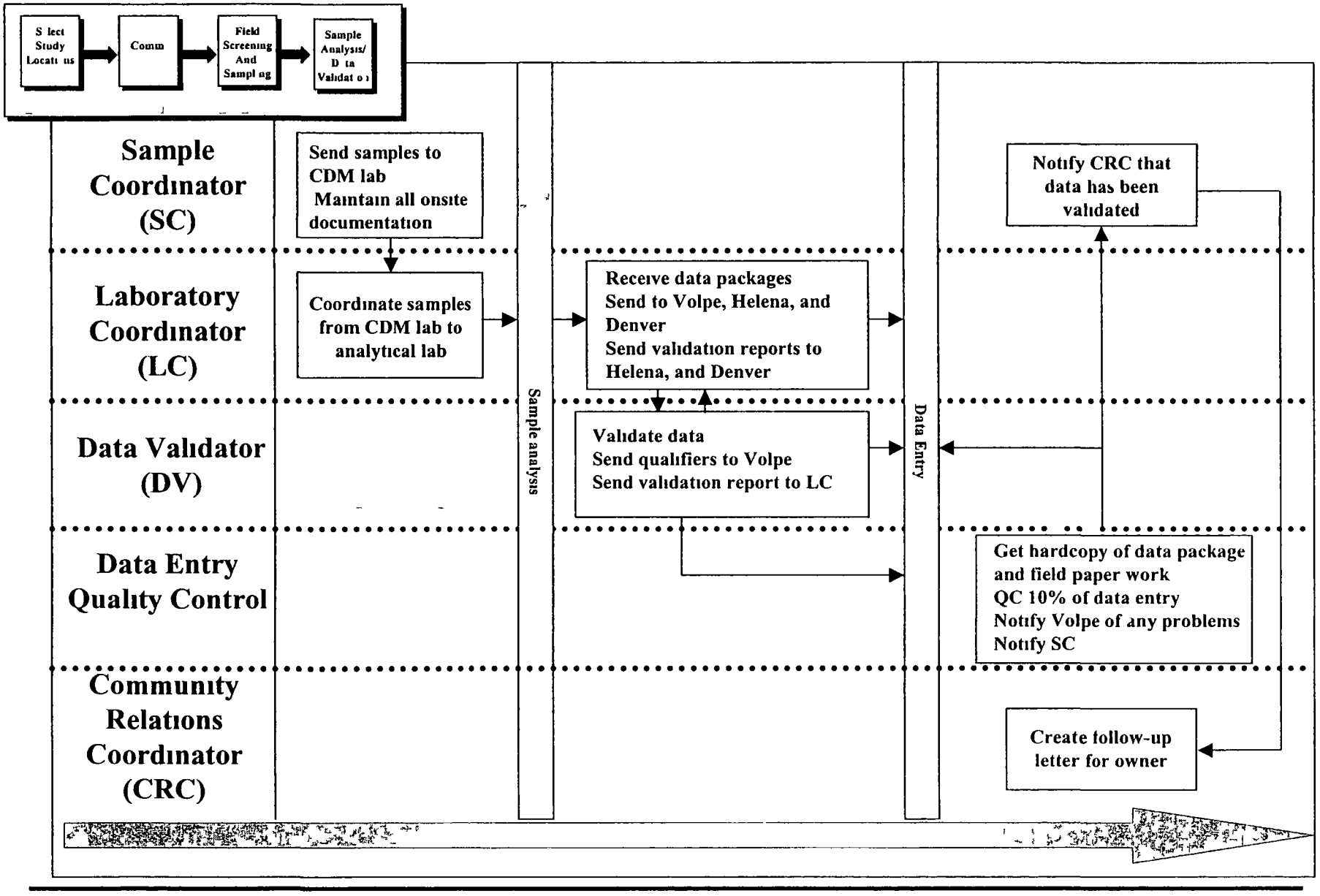


Figure 5-7 Conceptual Site Model

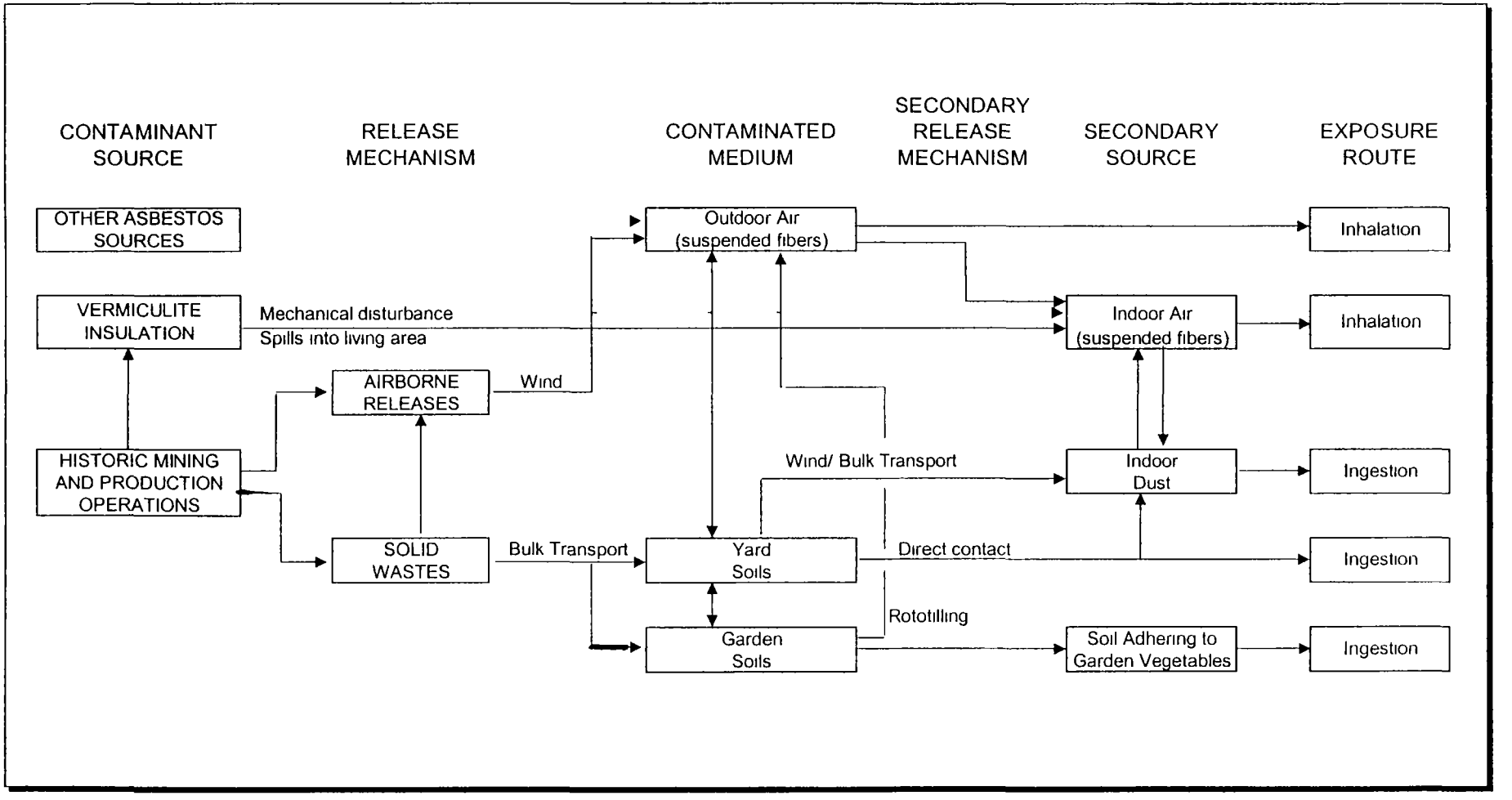


Figure created by the Syracuse Research Group (version 7 April 2 2002)

Section 6
Measurement and Data Acquisition

This section addresses sample process design sampling method requirements, handling and custody, analytical methods, QC, equipment maintenance instrument calibration, supply acceptance, nondirect measurements, and data management The field procedures are designed so that the following occurs

- Samples collected are consistent with project objectives
- Samples are collected in a manner so that data represent actual site conditions

6 1 Sample Process Design

The goal of the CSS is to determine the presence or absence of sources of Libby amphiboles at each property within the study area The number, types locations and analyses of samples are presented in Section 3 and 4

6 2 Sampling Methods and Requirements

Sampling equipment and preparation, sample containers and sample collection handling, and shipment are described below

6 2 1 Sampling Equipment and Preparation

Sampling equipment required for the field program (including environmental sampling, equipment and personal decontamination and general field operations) is presented in Section 4 of the FSP

Field preparatory activities include review of SOPs procurement of field equipment laboratory coordination, confirmation of site access, as well as a field planning meeting that includes field personnel and QA staff Mobilization is described in Section 4 of the FSP

6 2 2 Sample Containers

Sample containers required for this investigation are presented in Table 3-1

6 2 3 Sample Collection, Handling, and Shipment

Samples collected during this investigation will consist of surface soil samples and QC samples All sample collection procedures are outlined in Section 4 of the FSP and CDM's Technical SOP Manual (CDM 2001) QC samples will also be collected, handled, and shipped in accordance with these procedures

6 3 Sample Handling and Custody Requirements

Custody and documentation for field and laboratory work are described below, followed by a discussion of corrections to documentation

6 3 1 Field Sample Custody and Documentation

Sample custody and documentation will follow the requirements specified in CDM s SOP 1-2 Sample Custody and site-specific SOPs for completion of field data sheets and chain-of-custody forms All samples and sampling paper work (chain-of-custody forms field data sheets, survey forms etc) will be relinquished to the sample coordinator at the end of each day The sample coordinator will be responsible for management of all survey forms field data sheets and chain-of-custody records The distribution of all field paperwork is discussed in Section 6 10

6 3 1 1 Sample Labeling and Identification

Samples will be labeled with index identification numbers supplied by the Volpe Center These numbers will be maintained by the sample coordinator and signed out by sampling teams Sample index identification numbers will identify the samples collected during the CSS by having the following format

CSS-#####

Where

CSS = Contaminant screening study
= A sequential five digit number

6 3 1 2 Chain-of-Custody Requirements

Chain-of-custody (COC) procedures and sample shipment will follow the requirements stated in CDM s SOP 1-2 Sample Custody and SOP 2-8, Packaging and Shipping of Environmental Samples The COC record is used as physical evidence of sample custody and control This record system provides the means to identify, track and monitor each individual sample from the point of collection through final data reporting A complete COC record is required to accompany each shipment of samples

At the end of each day all samples will be relinquished to the sample coordinator by the sampling team following COC procedures The sample coordinator will follow COC procedures to ensure proper sample custody between acceptance of the samples from the field teams to shipment to the laboratory

6 3 1 3 Sample Packaging and Shipping

Samples will be packaged and shipped in accordance with CDM s SOP 2-8 Packaging and Shipping of Environmental Samples Custody seals will be placed over at least two sides of the cooler and then secured by tape if custody is released to a non-sampler All samples will be shipped by an overnight delivery service to the designated laboratory

The sample coordinator will be responsible for packaging and shipment of samples

6 3 1 4 Field Logbooks and Records

Field logbooks will be maintained in accordance with SOP 4-1 Field Logbook Content and Control The log is an accounting of activities at the site and will duly note problems or deviations from the governing plans and observations relating to the sampling and analysis program The sample coordinator will maintain the logbooks and will send original field logbooks, as they are completed to the CDM office in Helena, Montana for document control A copy of each logbook will be maintained in the CDM office in Libby, Montana and Denver Colorado The distribution of all field paperwork is discussed in Section 6 10

6 3 2 Laboratory Custody Procedures and Documentation

Laboratory custody procedures are provided in the laboratories QA management plan Upon receipt at the laboratory, each sample shipment will be inspected to assess the condition of the shipping cooler and the individual samples This inspection will include verifying sample integrity The enclosed COC records will be cross-referenced with all of the samples in the shipment The laboratory sample custodian will sign these records and provide copies for placement in the project files The sample custodian may continue the COC record process by assigning a unique laboratory number to each sample on receipt This number, if assigned will identify the sample through all further handling It is the laboratory s responsibility to maintain internal logbooks and records throughout sample preparation, analysis, and data reporting

6 3 3 Corrections to and Deviations from Documentation

Logbook modification requirements are described in CDM s SOP 4-1 Field Logbook Content and Control For the logbooks, a single strikeout initial and date is required for documentation changes The correct information should be entered in close proximity to the erroneous entry All deviations from the guiding documents will be recorded in the logbooks Any major deviations will be documented according to the quality management plan (CDM 1996b)

6 4 Analytical Methods Requirements

The laboratory QA program and analytical methods are addressed below

6 4 1 Laboratory Quality Assurance Program

Samples collected during this project will be analyzed in accordance with standard EPA and/or nationally recognized analytical procedures The purpose of using standard procedures is to provide analytical data of known quality and consistency Analytical laboratories will adhere to QC requirements as established by EPA methods

6 4 2 Methods

The methods to be used for analysis are presented in Section 5 4 2 4

6 5 Quality Control Requirements

Field laboratory and internal office QC are discussed below Figure 6-1 represents the QC measures to be implemented from the field and laboratory prospective during each phase of the CSS process

6 5 1 Field Quality Control Samples

Table 5-1 summarizes the field QC samples that will be collected

6 5 2 Laboratory Quality Control

The laboratories will follow all laboratory QC checks which may include laboratory duplicates LCSs and/or laboratory blanks

6 5 2 1 Laboratory Internal Quality Control Samples

QC data are necessary to determine precision and accuracy and to demonstrate the absence of interferences and/or contamination Each laboratory-based QC sample will be analyzed at a rate of 5 percent or one per batch (a batch is a group of up to 20 samples analyzed together) whichever is more frequent Results of the QC analysis will be included in the QC package QC samples may consist of laboratory duplicates laboratory blanks, and LCSs whichever is applicable and any other method-required QC samples

6 5 2 2 Laboratory Quality Control Checks

The laboratory will perform the QC checks required by each analytical method In addition the following sample types will be analyzed

Selected samples will be analyzed by both SEM and IR methods as described in Section 5 4 2 4

Laboratory split samples also will be analyzed to determine variability of sample analysis between laboratories as described in Section 5 4 2 4

A laboratory training program developed by the EPA will be implemented at the laboratories utilized to analyze samples for the CSS The training will be for new analysts and new equipment A draft version of the training program is provided in Appendix D

Laboratories utilized to analyze samples collected as part of the CSS will be required to provide proof to current certifications Examples of certifications include the following American Industrial Hygiene Association and National Voluntary Laboratory Accreditation Program If laboratory QC controls show consistent problems in the data validation process, a laboratory audit may be performed

6 5 3 Internal Quality Control Checks

Internal QC checks will be conducted throughout the project to evaluate the performance of the project team during data generation All internal QC will be conducted in accordance with RAC protocols All laboratory QC samples must be performed using samples from the investigation, if applicable

The CSS task leader will complete a 2 percent (1 in 50) QC check of field observations This QC check will be performed by revisiting homes identified by the field teams as not having ZAI present in the attics

Data entry into the Libby project database is performed by the Volpe Center with a 100 percent QC of the data CDM will perform an additional 10 percent QC on all data entered into the database by comparing field data sheets survey forms, COCs and analytical data This check will be performed on a daily basis on the data entered from the previous day

All project deliverables will receive technical and QA reviews prior to being issued to EPA These reviews will be conducted in accordance with CDM s Quality Procedure (QP) 3 2 Technical Document Review and QP 3 3 Quality Assurance Review (CDM 1997) Completed review forms will be maintained in the project files

A field audit will be performed during the first month of the field effort The field effort is expected to last for 6 months and a second field audit will be completed during the third month of the field effort

6 6 Equipment Maintenance Procedures

All field and laboratory equipment will be maintained in accordance with the manufacturers' maintenance and operating procedures

6 7 Instrument Calibration Procedures and Frequency

Calibration of laboratory instruments will be based on written procedures approved by laboratory management and included in the laboratory QC manual Instruments and equipment will be initially calibrated and continually calibrated at required intervals as specified by either the manufacturer or more updated requirements (e g , methodology requirements) Calibration standards used as reference standards will be traceable to EPA

Records of initial calibration, continuing calibration, repair, and/or replacement of laboratory equipment will be filed and maintained by the laboratory Calibration records will be filed and maintained at the laboratory location where the work is performed and are required to be included in data reporting packages

6 8 Acceptance Requirements for Supplies

Prior to acceptance all supplies and consumables will be inspected by a field team leader to ensure that they are in satisfactory condition and free of defects

6 9 Nondirect Measurement Data Acquisition Requirements

Nondirect measurement data include information from previous sampling events, site reconnaissance literature searches and interviews The acceptance criteria for such data include a review by someone other than the author Any measurement data included in information obtained from the above-referenced sources will determine further action only to the extent that those data can be verified by project staff

6 10 Data Management

Sample results data will be delivered to the Volpe Center and CDM s Cambridge office both in hard copy and as an electronic data deliverable (EDD) Electronic copies of all project deliverables including graphics will be filed by project number Electronic files will be routinely backed up and archived

All results field data sheet information and survey forms will be maintained in the Libby project database managed by the Volpe Center The distribution of all paper work is shown in Figure 6-2

Figure 6-1 Quality Control Associated with Each Step of the CSS Process

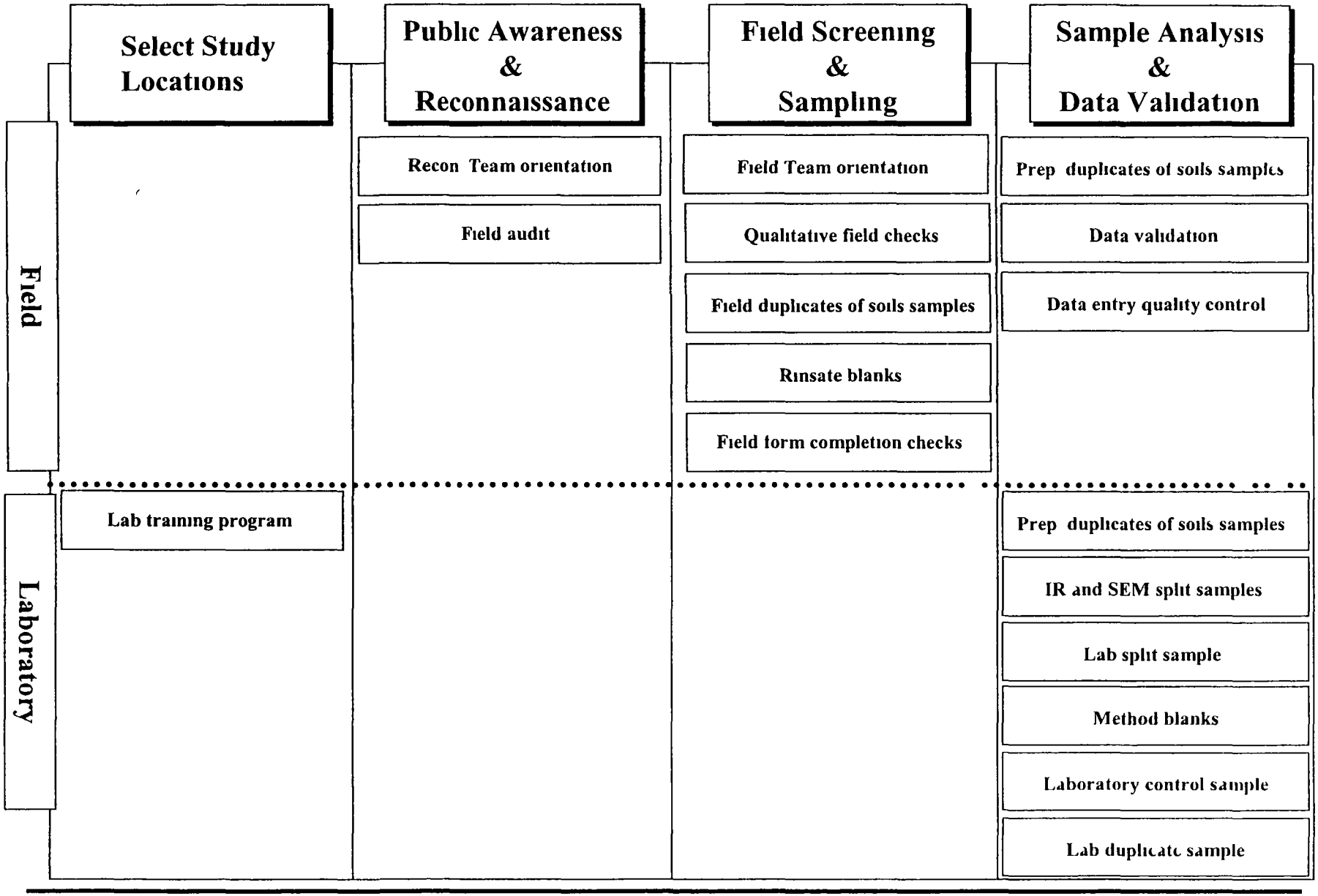
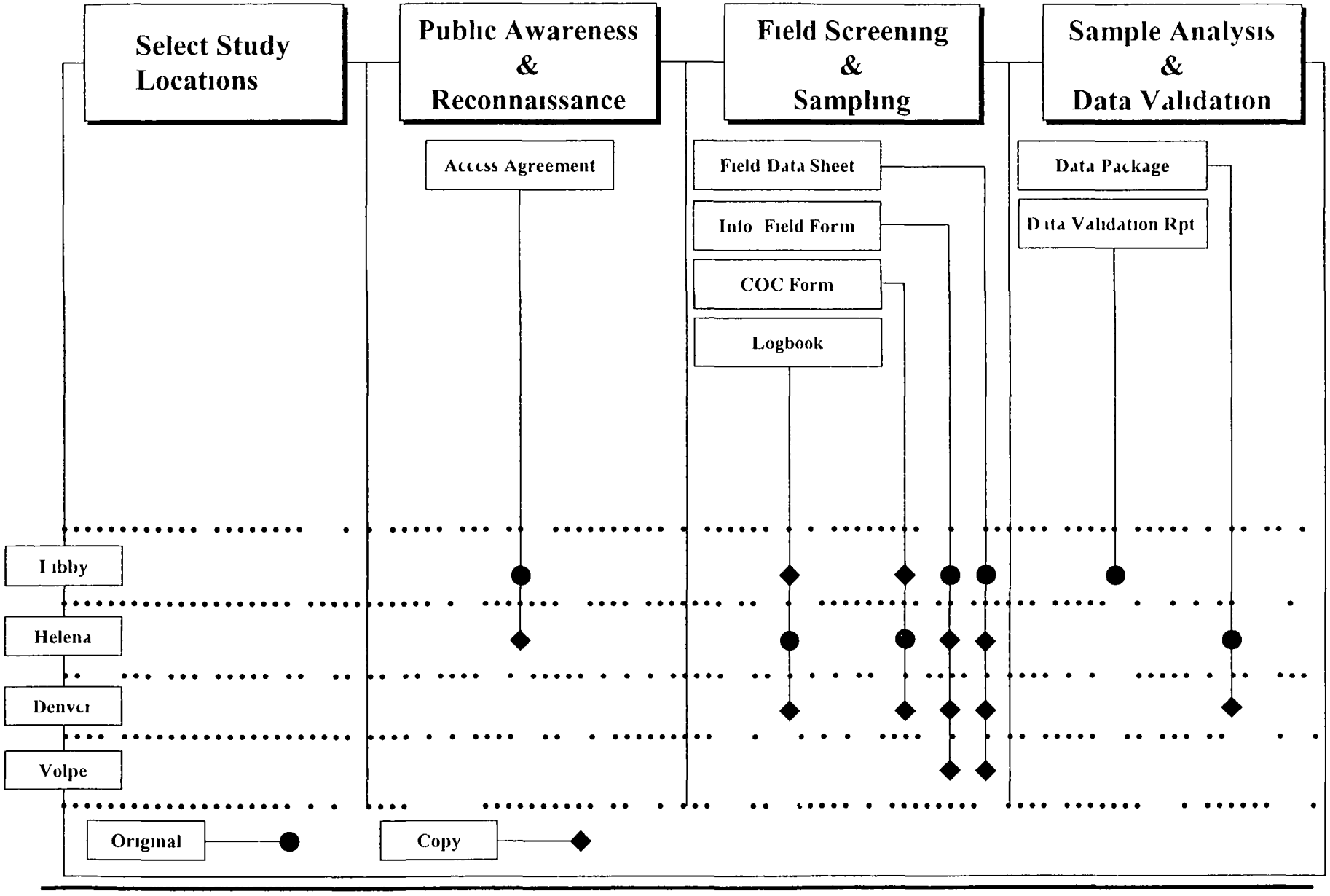


Figure 6-2 Document Filing Associated with Each Step of the CSS Process



Section 7
Assessment and Oversight

Assessments and oversight reports to management are necessary to ensure that procedures are followed as required and that deviations from procedures are documented These reports also serve to keep management current on field activities Assessment and oversight reports are discussed below

7 1 Assessments and Response Actions

Performance assessments are quantitative checks on the quality of a measurement system and may be used for analytical work System assessments are qualitative reviews of different aspects of project work to check on the use of appropriate QC measures and functioning of the QA system When a project exceeds 1 year, an office system assessment is required

Performance assessments for the laboratory may be accomplished by submitting reference material as blind reference (or performance evaluation) samples These assessment samples are samples with known concentrations that are submitted to the laboratory without informing the laboratory of the known concentration Samples will be provided to the laboratory for performance assessment upon request from the EPA RPM Laboratory audits may also be conducted upon request from the EPA RPM

Response actions will be implemented on a case-by-case basis to correct quality problems Minor response actions taken in the field to immediately correct a quality problem will be documented in the applicable logbook and verbally reported to the CDM project manager For verbal reports, the CDM project manager will complete a communication log to document that response actions were relayed to him The CDM project manager and the EPA RPM will approve major response actions taken in the field prior to implementation of the change Major response actions are those that may affect the quality or objective of the investigation Quality problems that cannot be corrected quickly through routine procedures require implementation of a Corrective Action Request (CAR) Form Corrective action forms will be implemented in accordance with CDM's QP 8 1 Correction Action (CDM 1997)

All formal response actions will be submitted to either CDM's RAC Region VIII QA specialist or RAC regional QA coordinator for review and issuance CDM s project manager or project QA coordinator will notify the QA manger or regional QA coordinator when quality problems arise that may require a formal response action

7 2 Reports to Management

QA reports will be provided to management whenever quality problems are encountered Field staff will note any quality problems in the field logbooks CDM s project manager will inform the project QA coordinator upon encountering quality issues that cannot be immediatelv corrected Monthly QA reports will be submitted

to CDM s RAC Region VIII QA manager bv the local QA coordinator and the RAC regional QA coordinator

Topics to be summarized regularlv may include but not be limited to technical and QA reviews that have been conducted activities and general program status project meetings corrective action activities, any unresolved problems assessment of data deficiencies and anv significant QA/QC problems not included above

Section 8
Data Validation and Usability

8 1 Data Review, Validation, and Verification Requirements

CDM will validate data submitted by analytical laboratories according to the CDM Site Specific SOP for Data Validation of Asbestos Results Obtained by Scanning Electron Microscopy for the Contaminant Screening Study of the Libby Asbestos Project, and the CDM Site Specific SOP for Data Validation of Asbestos Results Obtained by Reflectance Spectroscopy for the Contaminant Screening Study of the Libby Asbestos Project (provided in Appendix A) Data validation consists of examining the sample data packages against pre-determined standardized requirements The validator may examine as appropriate the reported results QC summaries, case narratives COC information, raw data, LCSs, initial and continuing calibration criteria and other reported information to determine the accuracy and completeness of the data package During this process the validator will verify that the analytical methodologies were followed and QC requirements were met Table 5-1 describes the guidelines to be followed for validation of the data All data qualified as estimated (J or UJ) are usable for decision-making purposes Results qualified as unusable (R) should not be used for decision-making purposes Data validation will occur on 100% of data collected ~~The Data Validation Reports with~~ PRESENTED PLEs will be evaluated during DV Acc and PQO issues The completion + Completeness will be addressed in the DI tech memo

Data verification includes checking that results have been transferred correctly from laboratory data printouts to the laboratory report and to the EDD

8 2 Reconciliation with Data Quality Objectives

Once data has been generated, CDM will evaluate that analytical data for the PARCC parameters as stated in Section 5 4 2 2 of this SAP Sample data will be maintained in the Libby Project Database and original data packages maintained in the CDM Helena Montana office Copies of data packages will be maintained in the CDM Denver, Colorado office

This page intentionally left blank

Section 9
References

CDM 2002 Original Work Plan for the Libby Asbestos Site Operable Unit 4 Libby Asbestos Remedial Investigation Sampling and Analysis Plan and Supporting Activities Libby, Montana March

_____ 2001 Technical Standard Operating Procedures Manual Revision 14

_____ 1997 Quality Assurance Manual Part Two Revision 8 October

_____ 1996a RAC Region VIII Quality Assurance Project Plan August

_____ 1996b RAC Region VIII Quality Management Plan August

EPA 2001 EPA Requirements for Quality Assurance Project Plans, QA/R-5 Final March

_____ 2000a Sampling and Quality Assurance Project Plan for Libby, Montana Environmental Monitoring for Asbestos Revision 1 January

_____ 2000b Guidance for the Data Quality Objectives Process, EPA QA/G-4 Final August

_____ 2000c Asbestos Analysis of Soil by Scanning Microscopy and Energy Dispersive X-Ray Spectroscopy Revision 0 July 11, 2000

Natural Resource Conservation Service (NRCS) 1998 Soil Survey of the Kootenai National Forest Area Soil Survey Staff September

NIOSH 1994 Asbestos (bulk) by PLM Method 9002 Issue 2 August

This page intentionally left blank

Appendix A

CDM Technical Standard Operating Procedures and Site-Specific Guidance Documants

This page intentionally left blank

Project-Specific Modification

SOP No 1-2

SOP Title Sample Custody

Project Libby Asbestos Remedial Investigation - Contaminant Screening Study (CSS)

Project No 3282-116

Client U S Environmental Protection Agency

Project Manager [signature] Date April 4, 2002

Technical Reviewer [signature] Date 4/5/02

QA Reviewer [signature] Date 4/5/02

Reason for and duration of modification Sample custody procedures for the Libby asbestos project vary slightly from SOP 1-2 These modifications are necessary for the entire duration of the project

Sample custody for all soil samples will be in accordance with SOP 1-2, with the following modifications

Section 3 0, Responsibilities - The field sample custodian is referred to as the sample coordinator for the Libby Asbestos Project

Section 4 0, Required Supplies - A project-specific chain-of-custody (COC) form will be used for the Libby Asbestos remedial investigation (RI) CSS

Section 5 1, Chain-of-Custody Record – The project-specific COC form will be completed according to the following guidelines

Send to Name of the laboratory that will receive the samples specific to COC To be completed by the sample coordinator

Via Hand delivery or shipped Hand delivery refers to samples delivered by hand to the onsite laboratory, shipped refers to samples sent to the laboratory by

Project-Specific Modification

delivery service (i e , Federal Express) To be completed by the sample coordinator

Project All samples collected in accordance with this sampling and analysis plan (SAP) are part of the CSS Circle CSS To be completed by the field team

Sample Placed in Cooler/Bag Refers to visual confirmation of the sample in the shipping container To be completed by the sample coordinator

Index ID Unique index identification number used to identify sample, in the form CSS-##### To be completed by the field team

Sample Date The date each sample was collected, in the form MM/DD/YY To be completed by the field team

Sample Time The time each sample was collected, in military time To be completed by the field team

Sample Matrix The matrix of each sample collected, specific to the CSS, S = soil and W = water To be completed by the field team

Sample Type Sample type of each sample collected, G = grab, C = composite To be completed by the field team

Volume Specific to air and dust samples Does not pertain to the CSS 'NA' should be placed in this field To be completed by the field team

Analysis Request Analysis of each sample collected All soil samples will be analyzed by IR IR will be written in the analysis request portion of the COC form by the field team The sample coordinator and/or laboratory coordinator may request SEM analysis based on Table 5-2 of the SAP The sample coordinator and/or laboratory coordinator will designate IR for the appropriate samples

Comments Any pertinent information regarding the sample (i e , vermiculite visible) will be entered by either the field team or the sample coordinator

Sample Received by Lab To be checked by the sample custodian at the laboratory upon receipt of the samples to confirm presence of each sample on the COC record

Total Number of Samples Total number of samples on the COC form To be completed by the field team

Project-Specific Modification

Additional Comments Any additional comments that relate to samples on the COC form (i e , turn around times) To be completed by the field team or sample coordinator

Relinquished by (1) Signed by field team member that relinquishes samples to sample coordinator and company of person relinquishing samples to sample coordinator (i e , CDM) Date of relinquish shall be in the form MM/DD/YY and time shall be in military time (2) Additional relinquished by lines to be completed following standard sample custody procedures

Received by (1) Signed by sample coordinator that receives samples from the sampling team and company of person accepting samples from the field teams (i e , CDM) Date and time of acceptance should be the same as date and time of relinquish (2) Additional received by lines to be completed following standard sample custody procedures

Sample Condition upon Receipt Will reflect the condition of samples at the relinquish time (i e , accept ok or not acceptable with an explanation) To be completed by the person receiving samples

Page ___ of ___ Sequential page number of the entire COC set sent to the laboratory To be completed by the sample coordinator

Chain of Custody Record **Libby Asbestos Investigation** **No 000000**

U S Environmental Protection Agency Region VIII
999 18th Street Suite 300
Denver CO 80202 2413

Send to _____

via ☐ hand delivery ☐ shipped

Project (circle 1) Phase I Phase II Removal Action CSS

Sample Placed in Cooler/Bag	Index ID	Sample Date	Sample Time	Sample Matrix (S Soil W Water D Dust A Air B Bulk Insulation)	Sample Type (G Grab C Composite)	Volume (L) or Area (cm^2)	Analysis Request	Comments	Sample Received by Lab
☐									☐
☐									☐
☐									☐
☐									☐
☐									☐
☐									☐
☐									☐
☐									☐
☐									☐
☐									☐

Phase I Air preparation method EPA/540/2 90/005a analytical method PCM (by NIOSH 7400) TEM (by ISO 10312 and AHERA) Dust preparation method ASTM D5755 95 analytical method ISO 10312 Solid PLM preparation and analysis by ISSI LIBBY 01/NIOSH 9002 Soil IR preparation and analysis method ISSI LIBBY 02 Soil TEM preparation method EPA/540/R 97/028 analytical method ISSI LIBBY 01/ISO 10312 **Phase II** Personal Air Stationary Air PCM (by NIOSH 7400) TEM (by Modified ISO 10312 – Phase 2 QAPP approved 2/01) or TEM (AHERA) method Bulk Insulation and Soil PLM Dust Samples TEM (by ISO 10312) **CSS** Soil SEM preparation by ISSI LIBBY 01 analytical method EPA LIBBY 01 Soil IR preparation by ISSI LIBBY 01 analytical method ISSI LIBBY 02 Water preparation by EPA 600/4 84 034 analytical method ISO 10312

Total Number of Samples _____ END OF SUBMITTAL

Additional Comments

_____

_____

Relinquished by (Signature and Company)	Date/Time	Received by (Signature and Company)	Date/Time	Sample Condition upon Receipt
Relinquished by (Signature and Company)	Date/Time	Received by (Signature and Company)	Date/Time	Sample Condition upon Receipt
Relinquished by (Signature and Company)	Date/Time	Received by (Signature and Company)	Date/Time	Sample Condition upon Receipt

SAMPLE CUSTODY

SOP 1 2
Revision 3
Date October 12, 2001

Prepared David O Johnson
Technical Review Jackie Mosher
QA Review Doug Updike
Approved
Signature/Date
Issued Rose Mary Gustin 10/12/01
Signature/Date

1 0 OBJECTIVE

Due to the evidentiary nature of samples collected during environmental investigations, possession must be traceable from the time the samples are collected until their derived data are introduced as evidence in legal proceedings To maintain and document sample possession, sample custody procedures are followed All paperwork associated with the sample custody procedures will be retained in CDM Federal Programs Corporation (CDM Federal) files unless the client requests that it be transferred to them for use in legal proceedings or at the completion of the contract

Note Sample custody documentation requirements vary with the specific EPA region or client This SOP is intended to present basic sample custody requirements, along with common options Specific sample custody requirements should be presented in the project-specific quality assurance (QA) project plan or project-specific modification or clarification form (See Section U-1)

2 0 BACKGROUND

2 1 Definitions

Sample – A sample is material to be analyzed that is contained in single or multiple containers representing a unique sample identification number

Sample Custody – A sample is under custody if

1 It is in your possession
2 It is in your view, after being in your possession
3 It was in your possession and you locked it up
4 It is in a designated secure area

Chain-of-Custody Record – A chain-of-custody record is a form used to document the transfer of custody of samples from one individual to another

Custody Seal - A custody seal is a tape-like seal that is part of the chain-of-custody process and is used to detect tampering with samples after they have been packed for shipping

Sample Label – A sample label is an adhesive label placed on sample containers to designate a sample identification number and other sampling information

Sample Tag – A sample tag is attached with string to a sample container to designate a sample identification number and other sampling information Tags may be used when it is difficult to physically place adhesive labels on the container (e g in the case of small air sampling tubes)

3 0 RESPONSIBILITIES

Sampler – The sampler is personally responsible for the care and custody of the samples collected until they are properly transferred or dispatched

Field Team Leader (FTL) – The FTL is responsible for ensuring that strict chain-of custody procedures are maintained during all sampling events The FTL is also responsible for coordinating with the subcontractor laboratory to ensure that adequate information is recorded on custody records The FTL determines whether proper custody procedures were followed during the fieldwork and decides if additional samples are required

Field Sample Custodian – The field sample custodian when designated by the FTL is responsible for accepting custody of samples from the sampler(s) and properly packing and shipping the samples to the laboratory assigned to do the analyses A field sample custodian is typically designated only for large and complex field efforts

4 0 REQUIRED SUPPLIES

- Chain of-custody records (applicable client or CDM Federal forms)
- Custody seals
- Sample labels or tags
- Clear tape

5 0 PROCEDURES

5 1 Chain-of-Custody Record

This procedure establishes a method for maintaining custody of samples through use of a chain-of-custody record This procedure will be followed for all samples collected or split samples accepted

Field Custody

1 Collect only the number of samples needed to represent the media being sampled To the extent possible, determine the quantity and types of samples and sample locations prior to the actual fieldwork As few people as possible should handle samples

2 Complete sample labels or tags for each sample, using waterproof ink

Transfer of Custody and Shipment

1 Complete a chain-of-custody record for all samples (see Figure 1 for an example of a chain-of-custody record Similar forms may be used when requested by the client) When transferring the possession of samples, the individuals relinquishing and receiving will sign, date, and note the time on the record This record documents sample custody transfer from the sampler, often through another person, to the sample custodian in the appropriate laboratory

- The date/time will be the same for both signatures when custody is transferred directly to another person When samples are shipped via common carrier (e g , Federal Express), the date/time will not be the same for both signatures Common carriers are not required to sign the chain-of-custody record
- In all cases, it must be readily apparent that the person who received custody is the same person who relinquished custody to the next custodian
- If samples are left unattended or a person refuses to sign this must be documented and explained on the chain-of-custody record

NOTE If a field sample custodian has been designated, he/she may initiate the chain-of-custody record, sign and date as the relinquisher The individual sampler(s) must sign in the appropriate block, but does (do) not need to sign and date as a relinquisher (refer to Figure 1)

2 Package samples properly for shipment and dispatch to the appropriate laboratory for analysis Each shipment must be accompanied with a separate chain-of-custody record

3 Include a chain-of-custody record identifying its content in all shipments (refer to Figure 1) The original record will accompany the shipment, and the copies will be retained by the FTL and, if applicable, distributed to the appropriate sample coordinators Freight bills will also be retained by the FTL as part of the permanent documentation

Figure 1
EXAMPLE CDM Federal Chain-of-Custody Record

CDM Federal Programs Corporation
A subsidiary of Camp Dresser & McKee Inc.

125 Maiden Lane 5th Floor
New York NY 10038
(212) 785 9 23
Fax (212) 785 9114

CHAIN OF CUSTODY RECORD

PROJECT ID	FIELD TEAM LEADER	LABORATORY AND ADDRESS	DATE SHIPPED
PROJECT NAME/LOCATION		LAB CONTRACT	AIRBILL NO

MEDIA TYPE
1 Surface Water
2 Groundwater
3 Leachate
4 Field QC
5 Soil Sediment
6 Oil
7 Waste
8 Other _____

PRESERVATIVES
1 HCl pH <2
2 HNO3 pH <2
3 NaOH pH >12
4 H2SO4 pH <2
5 Zinc Acetate pH >9
6 Ice Only
7 Not Preserved
8 Other _____

SAMPLE TYPE
G = Grab
C = Composite

SAMPLE LOCATION NO	LABORATORY SAMPLE NUMBER	PRESERVATIVES ADDED	MEDIA TYPE	SAMPLE TYPE	19 _ TIME DATE SAMPLED	ANALYSES (List no. of containers submitted)							REMARKS (Note if MS/MSD)
1													
2													
3													
4													
5													
6													
7													
8													
9													
10													

SAMPLER SIGNATURES

RELINQUISHED BY (PRINT)	DATE/TIME	RECEIVED BY (PRINT)	DATE/TIME	RELINQUISHED BY (PRINT)	DATE/TIME	RECEIVED BY (PRINT)	DATE/TIME
(SIGN)		(SIGN)		(SIGN)		(SIGN)	
RELINQUISHED BY (PRINT)	DATE/TIME	RECEIVED BY (PRINT)	DATE/TIME	RELINQUISHED BY (PRINT)	DATE/TIME	RECEIVED BY (PRINT)	DATE/TIME
(SIGN)		(SIGN)		(SIGN)		(SIGN)	

COMMENTS

DISTRIBUTION White and yellow copies accompany sample shipment to laboratory yellow copy retained by laboratory Pink copy retained by samplers

1/98

NOTE If requested by the client different chain-of-custody records may be used Copies of the template for this record may be obtained from the Fairfax Graphics Department

Procedure for Completing CDM Federal Example Chain-of-Custody Record (Refer to Figure 1)

The following procedure is to be used to fill out the CDM Federal chain-of-custody record The record is provided herein as an example chain-of-custody record If another type of custody record (i e , provided by the EPA contract laboratory program or a subcontract laboratory) is used to track the custody of samples, the custody record should be filled out in its entirety

1 Record project number

2 Record FTL for the project (if a field sample custodian has been designated, also record this name in the "Remarks box)

3 Record the name and address of the laboratory to which samples are being shipped

4 Enter the project name/location or code number

5 Record overnight courier's airbill number

6 Record sample location number

7 Record sample number

8 Note preservatives type and reference number

9 Note media type (matrix) and reference number

10 Note sample type

11 Enter date of sample collection

12 Enter time of sample collection in military time

13 When required by the client, enter the names or initials of the samplers next to the sample location number of the sample they collected

14 List parameters for analysis and the number of containers submitted for each analysis

15 Enter MS/MSD (matrix spike/matrix spike duplicate) if sample is for laboratory quality control or other remarks (e g sample depth)

16 Sign the chain-of-custody record(s) in the space provided All samplers must sign each record

17 If sample tags are used, record the sample tag number in the "Remarks" column

18 Record date shipped

19 The originator checks information entered in Items 1 through 16 and then signs the top left "Relinquished by" box, prints his/her name, and enters the current date and time (military)

20 Send the top two copies (usually white and yellow) with the samples to the laboratory retain the third copy (usually pink) for the project files Retain additional copies for the project file or distribute as required to the appropriate sample coordinators

21 The laboratory sample custodian receiving the sample shipment checks the sample label information against the chain-of-custody record Sample condition is checked and anything unusual is noted under Remarks on the chain-of custody record The laboratory custodian receiving custody signs in the adjacent 'Received by box and keeps the copy The white copy is returned to CDM Federal

5 2 Sample Labels and Tags

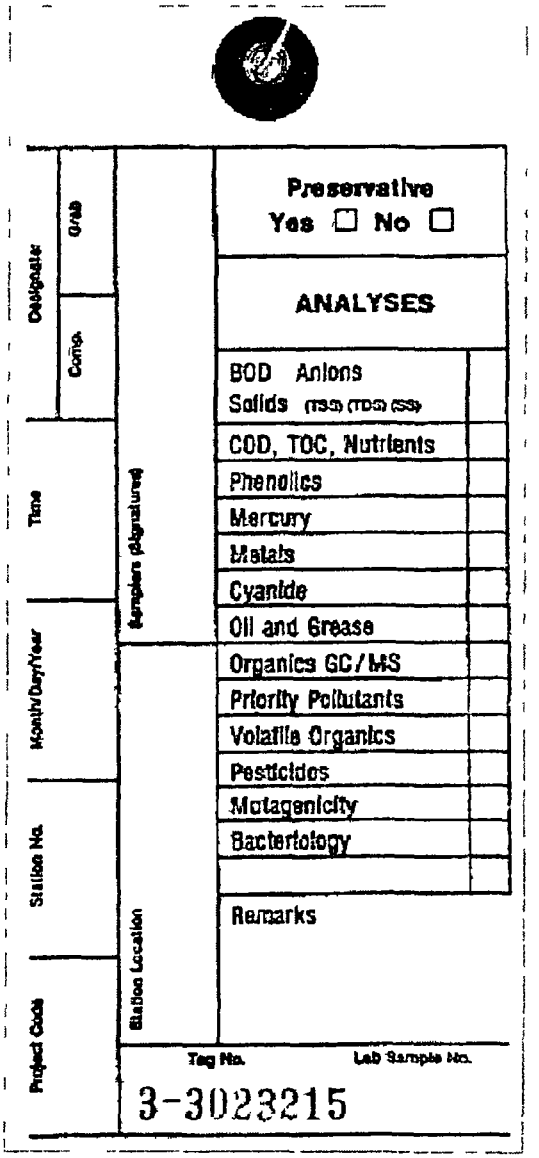
Unless the client directs otherwise, sample labels or tags will be used for all samples collected or accepted for CDM Federal projects

1 Complete one label or tag with the information required by the client for each sample container collected A typical label or tag would be completed as follows (see Figure 2 for example of sample tag, labels are completed with the equivalent information)
   - Record the project code (i e , project or task number)
   - Enter the station number (sample number) if applicable
   - Record the date to indicate the month day and year of sample collection
   - Enter the time (military) of sample collection
   - Place a check to indicate composite or grab sample
   - Record the station (sample) location
   - Sign in the space provided
   - Place a check next to "yes or no' to indicate if a preservative was added
   - Place a check under Analyses next to the parameters for which the sample is to be analyzed If the desired analysis is not listed write it in the empty slot Note Do not write in the box for 'laboratory sample number '
   - Place or write additional relevant information under 'Remarks'

2 Place adhesive labels directly on the sample containers Place clear tape over the label to protect from moisture

3 Securely attach sample tags to the sample bottle On 80 oz amber bottles, the tag string may be looped through the ring style handle and tied On all other containers it is recommended that the string be looped around the neck of the bottle, then twisted and re looped around the neck until the slack in the string is removed

Figure 2
EXAMPLE Sample Tag



NOTE Equivalent sample labels or tags may be used

5 3 Custodv Seals

Custodv seals must be placed on the shipping containers (e g picnic cooler) prior to shipment The seal should be signed and dated by a field team member

Custody seals may also be placed on individual sample bottles Check with the client or refer to EPA regional guidelines for direction

5 4 Sample Shipping

The CDM Federal standard operating procedure listed below defines the requirements for packaging and shipping environmental samples

- CDM Federal SOP 2 1 Packaging and Shipping of Environmental Samples

6 0 RESTRICTIONS/LIMITATIONS

Check with the EPA region or client for specific guidelines If no specific guidelines are identified this procedure should be followed

For EPA Contract Laboratory Program (CLP) sampling events, combined chain-of custody/traffic report forms or other EPA-specific records may be used Refer to regional guidelines for completing these forms

The EPA FORMS II Lite™ software may be used to customize sample labels and custody records when directed by the client or the CDM Federal project manager

7 0 REFERENCES

U S Environmental Protection Agency *EPA Guidance for Quality Assurance Project Plans* EPA QA/G-5 EPA/600/R-98/018, February 1998, Section B3

U S Environmental Protection Agency, *National Enforcement Investigations Center Multi-Media Investigation Manual*, EPA-330/9-89-003-R, Revised March 1992, p 85

U S Environmental Protection Agency, *Contract Laboratory Program (CLP) Guidance for Field Samplers*, EPA-540-R-00-003, Draft Final, June 2001, Section 3 2

U S Environmental Protection Agency, *FORMS II Lite™ User s Guide*, March 2001

U S Environmental Protection Agency, Region IV *Environmental Investigations Standard Operating Procedures and Quality Assurance Manual*, May 1996, Section 3 3

U S Army Corps of Engineers, *Requirements for the Preparation of Sampling and Analysis Plan* EM 200-1-3, February 2001, Appendix F

Project-Specific Modification

SOP No 1 3

SOP Title Surface Soil Sampling

Project Libby Asbestos Remedial Investigation - Contaminant Screening Study (CSS)

Project No 3282-116

Client U S Environmental Protection Agency

Project Manager [signature] Date April 4, 2002

Technical Reviewer [signature] Date 4/5/02

QA Reviewer [signature] for D. Updike Date 4/5/02

Reason for and duration of modification Soil sampling procedures for Libby amphibole asbestos contamination are slightly different than CDM Technical SOP 1 3 These modifications are necessary for the entire duration of the project

All soil sampling will be collected in accordance with CDM Technical SOP 1-3 Surface Soil Sampling, with the following modifications

Section 2 2, Discussion - Sample depths for surface soil samples will generally be 0 to 1 inch for yard (i e grassy area) and 0 to 6 inches for disturbed areas (i e garden landscaping area) Composite samples will be composed of nearly equal portions of soil from up to five randomly discrete locations within a land use area

Section 4 0, Required Equipment - Neither ice bags nor blue ice will be used Since the sampling is for asbestos rather than metals or organic compounds the use of stainless steel or Teflon®-lined sampling instruments is determined not to be necessary The sampler may be a garden bulb planter trowel or other similar device In addition, plastic sheeting is not necessary during sampling

Section 5 2 3, Method for Collecting Samples for Nonvolatile Organic or Inorganic Compound Analysis - Quart-sized zip-topbags will be used as sample containers The zip-top bags will be filled approximately 1/2 full with soil (approximately 100 grams) The sample index identification (ID) sticker will be affixed to the inside of the bag, and the index ID number will be written on the outside of the bag with an indelible marker The sample will then be doublebagged with the same information recorded on the outer bag Further preparation (i e , drying, splitting) will be performed at the CDM laboratory

SURFACE SOIL SAMPLING

Prepared Del Baird
Technical Review Brian Jerks
QA Review Matt Brookshire
Approved
Signature/Date
Issued
Signature/Date

1 0 OBJECTIVE

The objective of this standard operating procedure (SOP) is to define the techniques and the requirements for collecting surface soil samples

2 0 BACKGROUND

Surface soils are generally defined as the soils extending from ground surface to approximately 1 foot below ground surface (bgs) Surface soil samples are frequently collected from 0 to 6 inches bgs The techniques and protocol described herein may be used to collect other surface media, including sediment and sludge

2 1 Definitions

Surface Soil - The soil that exists down from the surface approximately one foot (30 centimeters) Depending on application, the soil interval to be sampled will vary

Grab Sample - A discrete portion or aliquot taken from a specific location at a given point in time

Composite - Two or more sub-samples taken from a specific media and site at a specific point in time The sub-samples are collected and mixed, then a single average sample is taken from the mixture

Spoon/Scoop - A small stainless steel or Teflon® utensil approximately 6 inches in length with a stem-like handle

Trowel - A small stainless steel or Teflon® shovel approximately 6 to 8 inches in length with a slight (approximately 140°) curve across The trowel has a stem-like handle (for hand operation) Samples are collected with a spooning action

2 2 Discussion

Surface soil samples are collected to determine the type(s) and level(s) of contamination and are often important to risk assessment These samples may be collected as part of an investigative plan, site specific sampling plan, and/or as a screen for "hot spots," which may require more extensive sampling

Sediment(s) and sludge(s) that have been exposed by evaporation stream rerouting or any other means are collected by the same methods as those for surface soil(s) Typically the top 1 to 2 centimeters (cm) of material including vegetation, are carefully removed before collection of the sample

Surface soil and exposed sediment or sludge are collected using stainless steel and/or Teflon® lined trowels or scoops

2 3 Associated Procedures

- CDM Federal SOP 1-2, Sample Custody
- CDM Federal SOP 2 1, Packaging and Shipping of Environmental Samples
- CDM Federal SOP 4-1 Field Logbook Content and Control
- CDM Federal SOP 4-5 Field Equipment Decontamination at Non radioactive Sites

3 0 RESPONSIBILITIES

Site Manager The site manager is responsible for ensuring that sampling efforts are conducted in accordance with this procedure and any other SOPs pertaining to specific media sampling

Field Team Leader - The field team leader is responsible for ensuring that field personnel collect surface soil samples in accordance with this and other relevant procedures

4 0 REQUIRED EQUIPMENT

- Insulated cooler and waterproof sealing tape
- Ice bags or 'blue ice
- Latex or appropriate gloves
- Plastic zip-top bags
- Personal protective clothing and equipment
- Stainless steel and/or Teflon®-lined spatulas and pans, trays or bowls
- Stainless steel and/or Teflon®-lined trowels or spoons (or equipment as specified in the site specific plans)
- Plastic sheeting
- Project plans (work plan/health and safety plan)
- Appropriate sample containers
- Field logbook
- Indelible ink pen and/or marker
- Sample chain-of-custody forms
- Custody seals
- Decontamination supplies

Additional equipment is discussed in Section 5 2 2, VOC Field Sampling/Preservation Methods

5 0 PROCEDURES

5 1 Preparation

The following steps must be followed when preparing for sample collection

1 Don the appropriate personal protective clothing as dictated by the site-specific health and safety plan

2 Locate sampling location(s) in accordance with project documents (e g , work plan) and document pertinent information in the appropriate field logbook

3 Processes for verifying depth of sampling must be specified in the site specific plans

4 Place clean plastic sheeting on a flat, level surface near the sampling area if possible, and place equipment to be used on the plastic, place the insulated cooler(s) on separate plastic sheeting Cover all equipment and supplies with clean plastic sheeting when not in use

5 A clean, decontaminated trowel, scoop, or spoon will be used for each sample collected Other equipment may be used (e g , shovels) if constructed of stainless steel

5 2 Collection

The following general steps must be followed when collecting surface soil samples

1 Surface soil samples are normally collected from the least contaminated to the most-contaminated areas

2 Document the sampling events, recording the information in the designated field logbook Document any and all deviations from SOPs in the field logbook and include rationale for changes See CDM Federal SOP 4-1

3 Carefully remove stones, vegetation, snow, etc from the ground surface in the immediate vicinity of the sampling location

4 First collect required sample aliquot for volatile analyses as well as any other samples that would be degraded by aeration Follow with collection of samples for other analyses

5 Decontaminate sampling equipment between locations See CDM Federal SOP 4-5

5 2 1 Method for Collecting Samples for Volatile Organic Compound (VOC) Analysis

The requirements for collecting grab samples of surface soil for VOCs or other samples degraded by aeration are as follows

1 VOC samples shall be collected with the least disturbance possible

2 VOC samples shall be collected as grab samples however, the method of collection will vary from site to site based on data quality objectives and the degree of known or suspected contamination

3 Complete sample label by filling in the appropriate information and securing the label to the container Cover the sample label with a piece of clear tape

4 Use a clean stainless steel or Teflon®-lined trowel or spoon (or tube) to collect sufficient material in one grab to fill the sample containers

5 With the aid of a clean stainless steel spatula quickly fill the sample containers directly from the sampling device, removing stones, twigs, grass etc , from the sample Fill the containers as full and compact as possible to minimize headspace

6 Immediately secure the Teflon® lined cap(s) on the sample container(s)

7 Wipe the containers with a clean Kimwipe or paper towel to remove any residual soil from the exterior of the container

8 Place the containers in individual zip-top plastic bag(s) and seal the bag(s)

9 Pack all samples as required Include properly completed documentation and affix signed and dated custody seals to the cooler lid

NOTE A trip blank should be included with sample coolers containing VOC samples QA sample requirements vary from project to project Consult the project-specific work plan for requirements

5 2 2 Field Sampling/Preservation Methods

The following four sections contain SW 846 methods for sampling and field preservation These methods include EN CORE™ Sampler Method for low-level detection limits, EN CORE™ Sampler Method for high level/detection limits/screening, acid preservation and methanol preservation These methods are very detailed and contain equipment requirements at the beginning of each section

NOTE Some variations from these methods may be required depending on the contracted analytical laboratory such as sample volume

5 2 2 1 EN CORE™ SAMPLER COLLECTION FOR LOW LEVEL ANALYSES (≥1 UG/KG)

EN CORE™ Sampling Equipment Requirements

The following equipment is required for low-level analysis

- Three 5-g samplers

NOTE The sample volume requirements are general requirements Actual sample volumes, sizes and quantities may vary depending on client or laboratory requirements

- One 4-ounce widemouth glass jar or applicable container for moisture analysis
- One T-handle
- Paper towels

EN CORE™ Sampling Steps for Low Level Analysis

1 Remove sampler and cap from package and attach T-handle to sampler body

2 Quickly push the sampler into a freshly exposed surface of soil until the O-ring is visible within the hole on the side of the T-handle If the O-ring is not visible within this window, then the sampler is not full

3 Extract the sampler and wipe the sampler head with a paper towel so that the cap can be tightly attached

4 Push cap on with a twisting motion to secure to the sampler body

5 Rotate the sampler stem counterclockwise until stem locks in place to retain sample within the sampler body

6 Fill out sample label and attach to sampler

7 Repeat procedure for the other two samplers

8 Collect moisture sample in 4-ounce widemouth jar using a clean stainless steel spoon or trowel

9 Store samplers at 4° Celsius Samples must be shipped and delivered to the analytical laboratory for extraction within 48 hours

NOTE Verify state requirements for extraction/holding times

5 2 2 2 ACID PRESERVATION SAMPLING FOR LOW LEVEL ANALYSES (≤1 UG/KG)

Acid Preservation Sampling Equipment Requirements

The following equipment and supplies are required if field acid preservation is required

- One 40mL VOA vial with acid preservation (for field testing of soil pH)
- Two pre weighed 40mL VOA vials with acid preservative and stir bar (for lab analysis)
- Two pre weighed 40mL VOA vials with water and stir bar (in case samples cannot be pre preserved)
- One pre weighed jar that contains methanol or a pre weighed empty jar accompanied with a pre weighed vial that contains methanol (for screening sample and/or high level analysis)
- One 4-oz widemouth glass jar or applicable container for moisture analysis
- One 2-oz jar with acid preservative (in case additional acid is needed due to high soil pH)
- One appropriately sized scoop capable of delivering 1g of solid sodium bisulfate
- pH paper
- Weighing scale capable of reading to 0 01g
- Set of balance weights used in daily balance calibration
- Gloves for working with pre weighed sample vials
- Paper towels
- Sodium bisulfate acid ($NaHS0_4$)
- A cutoff plastic syringe or other coring device capable of collecting sufficient sample volume (5g)

Testing Effervescing Capacity of Soils

Soils must be tested with acid to determine the amount of effervescing that will occur when preserved with acid Effervescing will drive off VOCs as well as create a high pressure in a sealed vial that could result in the explosion of the sample container The following steps provide information on the effervescing capacity of the soil

1 Place approximately 5g of soil into a vial that contains acid preservative and no stir bar

2 Do not cap this vial as it may EXPLODE upon interaction with the soil

3 Observe the sample for gas formation (due to carbonates in the soil)

4 If vigorous or sustained gas emissions are observed then acid preservation is not acceptable to preserve the sample
   - In this case the samples need to be collected in the VOA vials with only water and a stir bar The vials with acid preservative CANNOT be used

5 If a small amount or no gas formation occurs, then acid preservation is acceptable to preserve the sample Keep this testing vial for use in the buffering test detailed below

- In this case the samples need to be collected in the VOA vials with the acid preservative and a stir bar

Testing Buffering Capacity of Soils

The soils must be tested to determine the quantity of acid that is required to achieve a pH reading of ≤ 2 standard units (STUs) The following steps will assist in determining this quantity

1 If acid preservation is acceptable for sampling soils, then the sample vial that was used to test the effervescing capacity of the soils can be used to test the buffering capacity

2 Cap the vial that contains 5g of soil, acid preservative, and no stir bar from Step 1 in the effervescing test

3 Shake the vial gently to homogenize the contents

4 Open the vial and check the pH of the acid solution with pH paper

- If the pH paper reads below 2, then the sampling can be done in the two pre weighed 40mL VOA vials with the acid preservative and stir bar Since the pH was below 2 it is not necessary to add additional acid to the vials

- If the pH paper reads above 2, then additional acid needs to be added to the sample vial

5 Use the jar with the solid sodium bisulfate acid and add another 1g of acid to the sample

6 Cap the vial and shake thoroughly again

7 Repeat Step 4

- If the pH paper reads below 2, then the sampling can be done in the two pre-weighed 40mL VOA vials with the acid preservative and stir bar and one extra gram of acid

- Make a note of the extra gram of acid needed so the same amount of acid can be added to the vials the lab will analyze

- If the pH paper reads above 2, repeat Steps 5 through 7 until the sample pH ≤2 STUs

Now that the soil chemistry has been determined, the actual sampling can occur The procedure stated below assumes the correct vials are used based on the guidance discussed

Sample Preservation Steps

1 Wear gloves during all handling of pre weighed vials

2 Add more acid if necessary (based on the buffering capacity testing discussed in the previous section)

3 Quickly collect a 5g sample using a cut off plastic syringe or other coring device designed to deliver 5g of soil from a freshly exposed surface of soil

4 Carefully wipe exterior of sample collection device with a clean paper towel

5 Quickly transfer the sample to the appropriate VOA vial, use caution when extruding the sample to prevent splashing of the acid in the vial

6 Remove any soil from the threads of the sample vial using a clean paper towel

7 Cap vial and weigh the jar to the nearest 0 01g

8 Record exact weight on sample label

9 Repeat sampling procedure for the duplicate VOA vial

10 Weigh the vial containing methanol preservative in it to the nearest 0 01g If the weight of the vial with methanol varies by more than 0 01g from the original weight recorded on the vial discard the vial If the weight is within tolerance, it can be used for soil preservation below

11 Take the empty jar or the jar that contains the methanol preservative

12 Quickly collect a 25g or 5g sample using a cut off plastic syringe or other coring device designed to deliver 25g or 5g of soil from a freshly exposed surface of soil The 25g or 5g size is dependent on who is doing the sampling and requirements specified by the analytical laboratory

13 Carefully wipe the exterior of the collection device with a clean paper towel

14 Quickly transfer the soil to an empty jar or a jar that contains methanol If extruding into a jar that contains methanol, be careful not to splash the methanol outside of the vial

15 If the jar used to collect the soil plug was empty before the soil was added, immediately preserve with the methanol provided, using only one vial of methanol preservative per sample jar

16 Remove any soil from the threads of the sample vial using a clean paper towel and cap the jar

17 Weigh the jar with sample to the nearest 0 01g and record the weight on the sample label

18 Collect dry weight sample using a clean stainless steel spoon or trowel

19 Store samples at 4° Celsius

20 Ship sample containers to the analytical laboratory with plenty of ice in accordance with Department of Transportation (DOT) regulations (CORROSIVE FLAMMABLE LIQUID POISON)

5 2 2 3 EN CORE™ SAMPLER COLLECTION FOR HIGH LEVEL ANALYSES (≥200 UG/KG)

EN CORE™ Sampling Equipment Requirements

The following equipment is required for high-level analysis

- One 25-g sampler or one 5-g sampler

NOTE The volume requirements specified are general requirements Actual sample volumes, container sizes, and quantities may vary depending on client or laboratory requirements

- One 4-oz widemouth glass jar of applicable container specified for moisture analysis
- One T-handle
- Paper towels

EN CORE™ Sampling Steps for High Level Analysis

1 Remove sample and cap from package and attach T handle to sampler body

2 Quickly push the sampler into freshly exposed surface of soil until the O-ring is visible within the hole/window on the side of the T-handle If the O-ring is not visible within the window/hole, then the sampler is not full

3 Use a clean paper towel to quickly wipe the sampler head so that the cap can be tightly attached

4 Push cap on with a twisting motion to secure to the sampler body

5 Fill out sample label and attach to sampler

6 Rotate sampler stem counterclockwise until the stemlocks in place to retain the sample within the sampler body

7 Collect moisture sample in 4-oz widemouth glass jar or designated container using a clean stainless steel spoon or trowel

8 Store samplers at 4° Celsius Samples must be shipped and delivered to the analytical laboratory for extraction within 48 hours

NOTE Verify state requirements for extraction/holding times

5 2 2 4 METHANOL PRESERVATION SAMPLING FOR HIGH LEVEL ANALYSES (≥200 UG/KG)

Methanol Preservation Sampling Equipment Requirements

- One pre-weighed jar that contains methanol or a pre-weighed empty jar accompanied with a pre weighed vial that contains methanol (laboratory grade)
- One dry weight cup
- Weighing balance that accurately weighs to 0 01g
- Set of balance weights used in daily balance calibration
- Latex gloves
- Paper towels
- Cutoff plastic syringe or other coring device to deliver 5g or 25g of soil

Sampling Preservation Steps

1 Wear gloves during all handling of pre-weighed vials

2 Weigh the vial containing methanol preservative in it to the nearest 0 01g If the weight of the vial with methanol varies by more than 0 01g from the original weight recorded on the vial discard the vial If the weight is within tolerance, it can be used for soil preservation/ collection below

3 Take the empty jar or the jar that contains the methanol preservative

4 Quickly collect a 25g or 5g sample using a cut off plastic syringe or other coring device designed to deliver 25g or 5g of soil from a freshly exposed surface of soil

5 Carefully wipe the exterior of the collection device with a clean paper towel

6 Quickly transfer the soil to an empty jar or a jar that contains methanol If extruding into a jar that contains methanol be careful not to splash the methanol outside of the vial Again the type of jar used is dependent on who is doing the laboratory analysis

7 If the jar used to collect the soil plug was empty before the soil was added, immediately preserve with the methanol provided, using only one vial of methanol preservative per sample jar

8 Remove any soil from the exterior of the vial using a clean paper towel and cap the sample jar

9 Weigh the jar with the soil in it to the nearest 0 01g and record the weight on the sample label

10 Collect dry weight sample using a clean stainless steel spoon or trowel

11 Store samples at 4° Celsius

12 Ship sample containers with plenty of ice to the analytical laboratory in accordance with DOT regulations (CORROSIVE FLAMMABLE LIQUID POISON)

5 2 3 Method for Collecting Samples for Nonvolatile Organic or Inorganic Compound Analysis

The requirements for collecting samples of surface soil for nonvolatile organic or inorganic analyses are as follows

1 Label each sample container with the appropriate information Secure the label by covering it with a piece of clear tape

2 Use a decontaminated stainless steel or Teflon®-lined trowel or spoon to obtain sufficient sample from the required interval and sub-sampling points if necessary to fill the specified sample containers

3 Empty the contents of each fill of the sampling device directly into a clean stainless steel or Teflon®-lined tray or bowl

4 Homogenize the sample by mixing with a spoon, spatula, or trowel

5 Use the spoon, spatula, or trowel to distribute the uniform mixture into the labeled sample containers Fill organic sample containers first, then inorganics

6 Secure the appropriate cap on each container immediately after filling it

7 Wipe the sample containers with a clean Kimwipe or paper towel to remove any residual soil

8 Place sample containers in individual zip-top plastic bags and seal the bags

9 Pack all samples as required Include properly completed documentation and affix custody seals to the cooler lid

10 Decontaminate sampling equipment according to CDM Federal SOP 4-5

6 0 RESTRICTIONS/LIMITATIONS

When grab sampling for VOC analysis or for analysis of any other compound(s) that may be degraded by aeration, it is necessary to minimize sample disturbance and hence analyze loss The representativeness of this sample is difficult to determine because the collected sample represents a single point is not homogenized and has been disturbed

7 0 REFERENCES

U S Department of Energy Hazardous Waste Remedial Actions Program *Quality Control Requirements For Field Methods*, DOE/HWP 69/R1 July 1990 or current revision

U S Department of Energy Hazardous Waste Remedial Actions Program *Standard Operating Procedures For Site Characterizations* DOE/HWP 100/R2 September 1996 or current revision

U S Environmental Protection Agency *A Compendium of Superfund Field Operations Methods* EPA/540/P 87/001 December 1987 or current revision

U S Environmental Protection Agency *Test Methods for Evaluating Solid Waste* Physical/Chemical Methods (SW-846) Third Edition November 1986 (as amended by Update III June 1997) Method 5035 Closed-System Purge-and-Trap and Extraction for Volatile Organics in Soil and Waste Samples

Project-Specific Modification

SOP No 2-1

SOP Title Packaging and Shipping of Environmental Samples

Project Libby Asbestos Remedial Investigation - Contaminant Screening Study (CSS)

Project No 3282-116

Client U S Environmental Protection Agency

Project Manager [signature] Date April 4, 2002

Technical Reviewer [signature] Date 4/5/02

QA Reviewer [signature] for D Updike Date 4/5/02

Reason for and duration of modification Procedures for shipping environmental samples for the Libby asbestos project vary slightly from CDM Technical SOP 2-1 These modifications are necessary for the entire duration of the project

Samples collected during this investigation will be packaged and shipped in accordance with CDM Technical SOP 2-1, with the following modifications

Section 1 4, Required Equipment - Vermiculite (or other absorbent material), bubble wrap, or ice will not be used for packaging or shipping samples

Section 1 5, Procedures - Lining the cooler with a garbage bag is determined not to be necessary since the samples will already be double-bagged No vermiculite or other absorbent material will be used to pack the samples No ice will be used

PACKAGING AND SHIPPING OF ENVIRONMENTAL SAMPLES

SOP 2-1
Revision 1
Date June 20 2001

Prepared Krista Lippoldt Technical Review Brian Jenks

QA Review David O Johnson Approved
Signature Date

Issued
Signature/Date

1 0 PACKAGING AND SHIPPING OF ALL SAMPLES – This standard operating procedure (SOP) applies to the packaging and shipping of all environmental samples If the sample is preserved or radioactive the following sections may also be applicable

Section 2 0 – Packaging and Shipping of Samples Preserved with Hexane
Section 3 0 – Packaging and Shipping of Samples Preserved with Sodium Hydroxide
Section 4 0 – Packaging and Shipping of Samples Preserved with Hydrochloric Acid
Section 5 0 – Packaging and Shipping of Samples Preserved with Nitric Acid
Section 6 0 – Packaging and Shipping of Samples Preserved with Sulfuric Acid
Section 7 0 – Packaging and Shipping of Limited Quantity Radioactive Samples

1 1 OBJECTIVE

The objective of this SOP is to outline the requirements for the packaging and shipment of environmental samples

1 2 BACKGROUND

1 2 1 Definitions

Environmental Sample An environmental sample is any sample that has less than reportable quantities for any hazardous constituents according to Department of Transportation (DOT) regulations promulgated in 49 CFR Part 172

Custody Seal – A custody seal is a narrow adhesive-backed seal that is applied to individual sample containers and/or the sample shipping container (i e cooler) before offsite shipment Custody seals are used as a protective mechanism to ensure that sample integrity is not compromised during transportation from the field to the analytical laboratory

Secondary Containment – A secondary containment is the container that the sample is shipped in (i e , plastic overpackaging if liquid sample is collected in glass)

Exempted Quantity – Exempted quantity is the amount of hazardous material that does not fall under DOT/IATA/ICAO regulations This exemption is very difficult to meet, most shipments will be made under limited quantity

Limited Quantity – Limited quantity is the maximum amount of a hazardous material for which there is a specific labeling or packaging exception

Performance Testing – Performance testing is the required testing of outer packaging These tests include the drop and stacking test

Qualified Shipper – A qualified shipper is a person who has been adequately trained to perform the functions of shipping hazardous materials

1 2 2 Discussion

Proper packaging and shipping is necessary to ensure the protection of the integrity of environmental samples shipped for analysis

1 2 3 Associated Procedure

- CDM Federal SOP 1-2, Sample Custody

1 3 RESPONSIBILITIES

Field Team Leader (FTL) - The field team leader is responsible for ensuring that packaging and sampling procedures are conducted in accordance with this SOP The field team leader is also responsible for ensuring that CDM Federal properly coordinates laboratory analysis of samples

1 4 REQUIRED EQUIPMENT

- Coolers with return address of CDM Federal office
- Heavy-duty plastic garbage bags
- Plastic Ziploc®-type bags, small and large
- Clear tape
- Fiber tape – nylon reinforced strapping tape
- Duct tape
- Vermiculite (or equivalent)*
- Bubble wrap (optional)
- Ice
- Custody seals
- Completed chain-of-custody record or CLP custody records, if applicable
- Completed bill of lading
- "This End Up" and directional arrow labels

* Check for any client-specific or laboratory requirements related to the use of absorbent packaging materials

1 5 PROCEDURES

The following steps must be followed when packing sample bottles and jars for shipment

1 Verify the samples undergoing shipment meet the definition of Environmental Sample and are not a hazardous material as defined by DOT Professional judgment and/or consultation with the appropriate health and safety coordinator or the health and safetv manager should be observed

2 Select a sturdy cooler in good repair Secure and tape the drain plug with fiber or duct tape Line the cooler with a large heavy dutv plastic garbage bag

3 Be sure the caps on all bottles are tight (will not leak), check to see that labels and chain of-custody records are completed properly (SOP 1 2, Sample Custodv)

4 Place all bottles in separate and appropriately sized plastic zip-top bags and close the bags Up to three VOA vials may be packed in one bag Bottles may be wrapped in bubble wrap Optionallv place three to six VOA vials in a quart metal can and then fill the can with vermiculite or equivalent Note Trip blanks must be included in coolers containing VOA samples

5 Place 2 to 4 inches of vermiculite (or equivalent) into a cooler that has been lined with a garbage bag and then place the bottles and cans in the bag with sufficient space to allow for the addition of more packing material between the bottles and cans It is preferable to place glass sample bottles and jars into the cooler vertically Due to the strength properties of a glass container there is much less chance for breakage when the container is packed vertically rather than horizontally

6 Put ice in large plastic zip-top bags (double bagging the zip-tops is preferred) and properly seal Place the ice bags on top of and/or between the samples Several bags of ice are required (dependant on outdoor temperature staging time etc) to maintain the cooler temperature at approximately 4° centigrade Fill all remaining space between the bottles or cans with packing material Securely fasten the top of the large garbage bag with fiber or duct tape

7 Place the completed chain-of-custody record or the CLP traffic report form (if applicable) for the laboratory into a plastic zip-top bag, seal the bag tape the bag to the inner side of the cooler lid and close the cooler

8 The cooler lid shall be secured with nylon reinforced strapping tape by wrapping each end of the cooler a minimum of two times Attach a completed chain-of-custody seal across the hinges of the cooler on opposite sides The custody seals should be affixed to the cooler with half of the seal on the strapping tape so that the cooler cannot be opened without breaking the seal Complete two more wraps around with fiber tape and place clear tape over the custody seals

9 The shipping container lid must be marked 'THIS END UP' and arrow labels that indicate the proper upward position of the container should be affixed to the cooler A label containing the name and address of the shipper (CDM Federal) shall be placed on the outside of the container Labels used in the shipment of hazardous materials (such as Cargo Only Air Craft, Flammable Solids, etc) are not permitted on the outside of containers used to transport environmental samples and shall not be used The name and address of the laboratory shall be placed on the container, or when shipping by common courier, the bill of lading shall be completed and attached to the lid of the shipping container

1 6 RESTRICTIONS/LIMITATIONS

The holding times for the samples packed for shipment must not be exceeded It is recommended that samples be packed in time to be shipped nightly for overnight delivery Use caution when shipping samples for weekend delivery, make arrangements with the laboratory before sending samples

2 0 PACKAGING AND SHIPPING OF SAMPLES PRESERVED WITH HEXANE

2 1 OBJECTIVE

This section provides guidance for the shipment of soil and water environmental samples regulated under the DOT Hazardous Materials Regulations and the IATA/ICAO Dangerous Goods Regulations for shipment by air and applies only to domestic shipments

2 2 BACKGROUND

2 2 1 Definitions

Section 1 2 1 defines the terms relevant to this section

2 2 2 Transportation

This section was prepared for the shipment of hexane-preserved samples

2 2 3 Containers

- 40 ml glass VOA vials (up to 1L per outer package)

2 3 RESPONSIBILITY

It is the responsibility of the qualified shipper to ensure that each shipment contains no more than the maximum of 24 VOA vials for a total liquid volume of 1 liter and that the shipment is packaged according to IATA/ICAO packaging instruction Y305 for limited quantities of hexane

REQUIRED EQUIPMENT

- Outer packaging (for limited quantities) insulated cooler that has passed the performance test
- Garbage bags
- Clear tape
- Duct tape
- Strapping tape (optional)
- Ziploc®-type bags small and large
- Vermiculite (or equivalent)*
- Bubble wrap
- Ice
- Chain-of-custody seals
- Chain-of-custody form
- Survey documentation (if shipping from Department of Energy [DOE] or radiological sites)
- Class 3 flammable liquid labels
- Orientation labels
- Consignor/consignee labels

* Check for any client-specific or laboratory requirements related to the use of absorbent packaging materials

2 5 PACKAGING

The following steps are to be followed when packaging limited quantity samples shipments

- Tape any interior opening in the cooler (drain plug) from the inside to ensure control of interior contents Also, tape the drain plug from the outside of the cooler
- All sample containers will be properly labeled and the label protected with waterproof tape prior to sampling
- At a minimum the label must contain
  - Project name
  - Project number
  - Date and time of sample collection
  - Sample location
  - Sample identification number
  - Collector s initials

- Preservative (note amount of preservative used in miscellaneous section of the chain-of-custody)

- Wrap each container (40 ml VOA vials) in bubble wrap (secure with waterproof tape) to prevent breakage
- Place the bubble wrapped container into a 2 7 mil Ziploc®-type bag, removing trapped air
- Place wrapped containers inside a polyethylene bottle filled with vermiculite seal the bottle (Maximum of 4 VOA vials will fit inside a 500-ml wide mouth polyethylene bottle)
- Place sufficient amount of vermiculite in the bottom of the cooler to absorb any leakage that may occur
- Place a garbage bag in the cooler
- Pack the samples appropriately inside the garbage bag (bottles placed upright) to prevent movement during shipment
- Place a sufficient amount of double-bagged ice around the samples to maintain the required temperature during shipment
- Seal the garbage bag by tying or taping
- The maximum weight of the cooler shall not exceed 30 kg (66 lbs) for any limited quantity shipment of dangerous goods
- Secure the chain-of-custody form (placed inside a Ziploc®-type bag) to the interior of the cooler lid
- If the shipment is from a DOE or other facility, place the results of the radiation screen and cooler/sample survey with the chain-of-custody
- Wrap strapping tape or duct tape around both ends of the cooler and around the cooler lid
- Affix custody seals to opposite sides of the cooler lid Cover the custody seals with clear waterproof tape
- Mark the outside of the cooler with the proper shipping name of the contents, corresponding UN number, and LTD QTY (as shown below)

  HEXANES MIXTURE
  UN1208
  LTD QTY

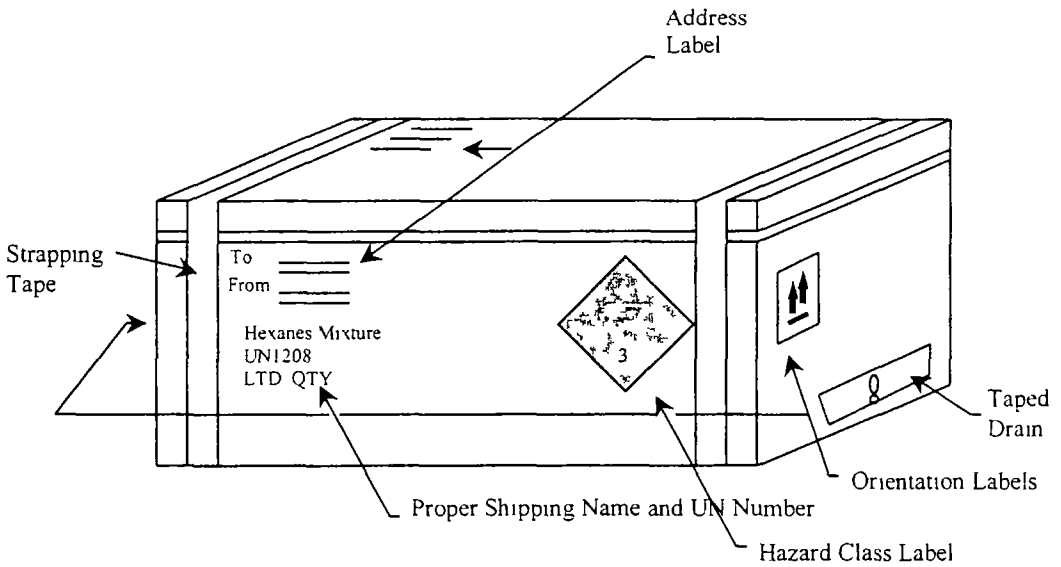
- Place a label on the front of the cooler with the company name contact name, phone number, full street address, and state with zip code for both shipper and recipient
- Affix a Flammable Liquid label to the outside of the cooler
- Affix package orientation labels on two opposite sides of the cooler
- Secure the marking and labels to the surface of the cooler with clear waterproof tape to prevent accidental removal during shipment
- An example of cooler labeling/marking locations is shown in Figure 1

NOTE No marking or labeling can be obscured by strapping or duct tape

NOTE The inner packaging of dangerous goods may be placed into the designated cooler for shipment Other non-regulated environmental samples may be added to the cooler for shipment

- When shipping from a DOE facility, the cooler will be surveyed by a qualified radiation control technician to ensure the exterior surfaces do not exceed 0 5 mrem/h on all sides This survey will be documented and the results reviewed by the qualified shipper
- Complete the Dangerous Goods and Hazardous Materials Inspection Checklist for Shipping Limited Quantity (Appendix A)
- Complete a Dangerous Goods Airbill

Figure 1 Example of Cooler Label/Marking Locations



3 0 PACKAGING AND SHIPPING OF SAMPLES PRESERVED WITH SODIUM HYDROXIDE

3 1 OBJECTIVE

This section provides guidance for the shipment of soil and water environmental samples regulated under the DOT Hazardous Materials Regulations and the IATA/ICAO Dangerous Goods Regulations for shipment by air and applies only to domestic shipments

3 2 BACKGROUND

3 2 1 Definitions

Section 1 2 1 defines the terms relevant to this section

3 2 2 Transportation

This section was prepared for the shipment of sodium hydroxide (NaOH) preserved samples

3 2 3 Containers

The inner packaging container (and amount of preservative) that may be used for these shipments includes

Exempted Quantities of Preservatives

Preservative		Desired in Final Sample		Quantity of Preservative (ml) for Specified Container				
		pH	Conc	40 ml	125 ml	250 ml	500 ml	1 L
NaOH	30%	>12	0 08%		25	0 5	1	2

5 drops = 1 ml

3 3 RESPONSIBILITY

It is the responsibility of the qualified shipper to determine the amount of preservative in each sample so that accurate determination of quantities can be made

REQUIRED EQUIPMENT

- Outer packaging (for limited quantities) insulated cooler that has passed the performance test
- Garbage bags
- Clear tape
- Duct tape
- Strapping tape (optional)
- Ziploc®-type bags, small and large
- Vermiculite (or equivalent)*
- Bubble wrap (optional)
- Ice
- Custody seals
- Chain-of-custody form

- Survey documentation (if shipping from Department of Energy [DOE] or radiological sites)
- Class 8 corrosive labels
- Orientation labels
- Consignor/consignee labels

* Check for any client-specific or laboratory requirements related to the use of absorbent packaging materials

3 5 PACKAGING

Samples containing NaOH as a preservative that exceed the exempted concentration of 0 08 percent (2 ml of a 30 percent per liter) will be shipped as a limited quantity per packing instruction Y809 of the IATA/ICAO Dangerous Goods Regulations

The following steps are to be followed when packaging limited quantity samples shipments

- Tape any interior opening in the cooler (drain plug) from the inside to ensure control of interior contents Also tape the drain plug from the outside of the cooler
- All sample containers will be properly labeled and the label protected with waterproof tape prior to sampling
- At a minimum the label must contain
  - Project name
  - Project number
  - Date and time of sample collection
  - Sample location
  - Sample identification number
  - Collector's initials
  - Preservative (note amount of preservative used in miscellaneous section of the chain-of-custody)
- This step is optional, wrap each container in bubble wrap (secure with waterproof tape) to prevent breakage
- Place the bubble wrapped container into a 2 7 mil Ziploc®-type bag, removing trapped air
- Place glass containers inside a polyethylene bottle filled with vermiculite, seal the bottle
- Place sufficient amount of vermiculite in the bottom of the cooler to absorb any leakage that may occur
- Place a garbage bag in the cooler
- Pack the samples appropriately inside the garbage bag (bottles placed upright) to prevent movement during shipment
- Place a sufficient amount of double bagged ice around the samples to maintain the required temperature during shipment
- Seal the garbage bag by tying or taping
- The maximum weight of the cooler shall not exceed 30 kg (66 lbs) for any limited quantity shipment of dangerous goods

- Secure the chain-of-custody form (placed inside a Ziploc®-type bag) to the interior of the cooler lid
- If the shipment is from a DOE or other facility, place the results of the radiation screen and cooler/sample survey with the chain of-custody
- Wrap strapping tape or duct tape around both ends of the cooler and around the cooler lid
- Affix custody seals to opposite sides of the cooler lid Cover the custody seals with clear waterproof tape
- Mark the outside of the cooler with the proper shipping name of the contents corresponding UN number, and LTD QTY (as shown below)

SODIUM HYDROXIDE SOLUTION
UN1824
LTD QTY

- Place a label on the front of the cooler with the company name, contact name, phone number, full street address, and state with zip code for both shipper and recipient
- Affix a Corrosive label to the outside of the cooler
- Affix package orientation labels on two opposite sides of the cooler
- Secure the marking and labels to the surface of the cooler with clear waterproof tape to prevent accidental removal during shipment
- An example of cooler labeling/marking locations is shown in Figure 1

NOTE Samples meeting the exemption concentration of 0 08 percent NaOH by weight will be shipped as non-regulated or non-hazardous

NOTE No marking or labeling can be obscured by strapping or duct tape

NOTE The inner packaging of dangerous goods may be placed into the designated cooler for shipment Other non-regulated environmental samples may be added to the cooler for shipment

- When shipping from a DOE facility, the cooler will be surveyed by a qualified radiation control technician to ensure the exterior surfaces do not exceed 0 5 mrem/h on all sides This survey will be documented and the results reviewed by the qualified shipper
- Complete the Dangerous Goods and Hazardous Materials Inspection Checklist for Shipping Limited Quantity (Appendix A)
- Complete a Dangerous Goods Airbill

4 0 PACKAGING AND SHIPPING OF SAMPLES PRESERVED WITH HYDROCHLORIC ACID

4 1 OBJECTIVE

This section provides guidance for the shipment of soil and water environmental samples regulated under the DOT Hazardous Materials Regulations and the IATA/ICAO Dangerous Goods Regulations for shipment by air and applies only to domestic shipments

4 2 BACKGROUND

4 2 1 Definitions

Section 1 2 1 defines the terms relevant to this section

4 2 2 Transportation

This section was prepared for the shipment of hydrochloric acid (HCl) preserved samples

4 2 3 Containers

The inner packaging container (and amount of preservative) that may be used for these shipments includes

Exempted quantities of preservatives

Preservative		Desired in Final Sample		Quantity of Preservative (ml) for Specified Container				
		pH	Conc	40 ml	125 ml	250 ml	500 ml	1 L
HCl	2N	<2	0 04%	2	5	1		

5 drops = 1 ml

4 3 RESPONSIBILITY

It is the responsibility of the qualified shipper to determine the amount of preservative in each sample so that accurate determination of quantities can be made

4 4 REQUIRED EQUIPMENT

- Outer packaging (for limited quantities) insulated cooler that has passed the performance test
- Garbage bags
- Clear tape

- Duct tape
- Strapping tape (optional)
- Ziploc®-type bags, small and large
- Vermiculite (or equivalent)*
- Bubble wrap
- Ice
- Custody seals
- Chain-of-custody form
- Survey documentation (if shipping from Department of Energy [DOE] or radiological sites)
- Class 8 corrosive labels
- Orientation labels
- Consignor/consignee labels

* Check for any client-specific or laboratory requirements related to the use of absorbent packaging materials

4 5 PACKAGING

The following steps are to be followed when packaging limited quantity samples shipments

- Tape any interior opening in the cooler (drain plug) from the inside to ensure control of interior contents Also, tape the drain plug from the outside of the cooler
- All sample containers will be properly labeled and the label protected with waterproof tape prior to sampling
- At a minimum the label must contain
  - Project name
  - Project number
  - Date and time of sample collection
  - Sample location
  - Sample identification number
  - Collector s initials
  - Preservative (note amount of preservative used in miscellaneous section of the chain-of-custody)
- Wrap each container (40 ml VOA vials) in bubble wrap (secure with waterproof tape) to prevent breakage
- Place the bubble wrapped container into a 2 7 mil Ziploc®-type bag, removing trapped air
- Place wrapped containers inside a polyethylene bottle filled with vermiculite, seal the bottle (Maximum of 4 VOA vials will fit inside a 500-ml wide-mouth polyethylene bottle)
- Place sufficient amount of vermiculite in the bottom of the cooler to absorb any leakage that may occur
- Place a garbage bag in the cooler

- Pack the samples appropriately inside the garbage bag (bottles placed upright) to prevent movement during shipment
- Place a sufficient amount of double bagged ice around the samples to maintain the required temperature during shipment
- Seal the garbage bag by tying or taping
- The maximum weight of the cooler shall not exceed 30 kg (66 lbs) for any limited quantity shipment of dangerous goods
- Secure the chain-of-custody form (placed inside a Ziploc®-type bag) to the interior of the cooler lid
- If the shipment is from a DOE or other facility place the results of the radiation screen and cooler/sample survey with the chain-of-custody
- Wrap strapping tape or duct tape around both ends of the cooler and around the cooler lid
- Affix custody seals to opposite sides of the cooler lid Cover the custody seals with clear waterproof tape
- Mark the outside of the cooler with the proper shipping name of the contents corresponding UN number, and LTD QTY (as shown below)

HYDROCHLORIC ACID SOLUTION
UN1789
LTD QTY

- Place a label on the front of the cooler with the company name contact name phone number full street address and state with zip code for both shipper and recipient
- Affix a Corrosive label to the outside of the cooler
- Affix package orientation labels on two opposite sides of the cooler
- Secure the marking and labels to the surface of the cooler with clear waterproof tape to prevent accidental removal during shipment
- An example of cooler labeling/marking locations is shown in Figure 1

NOTE Samples meeting the exemption concentration of 0 04 percent HCl by weight will be shipped as non-regulated or non-hazardous

NOTE No marking or labeling can be obscured by strapping or duct tape

NOTE The inner packaging of dangerous goods may be placed into the designated cooler for shipment Other non-regulated environmental samples may be added to the cooler for shipment

- When shipping from a DOE facility the cooler will be surveyed by a qualified radiation control technician to ensure the exterior surfaces do not exceed 0 5 mrem/h on all sides This survey will be documented and the results reviewed by the qualified shipper

- Complete the Dangerous Goods and Hazardous Materials Inspection Checklist for Shipping Limited Quantity (Appendix A)
- Complete a Dangerous Goods Airbill

5 0 PACKAGING AND SHIPPING OF SAMPLES PRESERVED WITH NITRIC ACID

5 1 OBJECTIVE

This section provides guidance for the shipment of soil and water environmental samples regulated under the DOT Hazardous Materials Regulations and the IATA/ICAO Dangerous Goods Regulations for shipment by air and applies only to domestic shipments

5 2 BACKGROUND

5 2 1 Definitions

Section 1 2 1 defines the terms relevant to this section

5 2 2 Transportation

This section was prepared for the shipment of nitric acid (HNO_3) preserved samples

5 2 3 Containers

The inner packaging container (and amount of preservative) that may be used for these shipments includes

Exempted quantities of preservatives

Preservative		Desired in Final Sample		Quantity of Preservative (ml) for Specified Container				
		pH	Conc	40 ml	125 ml	250 ml	500 ml	1 L
HNO_3	6N	<2	0 15%		2	4	5	8

5 drops = 1 ml

5 3 RESPONSIBILITY

It is the responsibility of the qualified shipper to determine the amount of preservative in each sample so that accurate determination of quantities can be made

5 4 REQUIRED EQUIPMENT

- Outer packaging (for limited quantities) insulated cooler that has passed the performance test
- Garbage bags
- Clear tape
- Duct tape
- Strapping tape (optional)
- Ziploc®-type bags small and large
- Vermiculite (or equivalent)*
- Bubble wrap (optional)
- Ice
- Custody seals
- Chain-of-custody form
- Survey documentation (if shipping from Department of Energy [DOE] or radiological sites)
- Class 8 corrosive labels
- Orientation labels
- Consignor/consignee labels

* Check for any client-specific or laboratory requirements related to the use of absorbent packaging materials

5 5 PACKAGING

Samples containing HNO_3 as a preservative that exceed the exempted concentration of 0 15% HNO_3 will be shipped as a limited quantity per packing instruction Y807 of the IATA/ICAO Dangerous Goods Regulations

The following steps are to be followed when packaging limited quantity samples shipments

- Tape any interior opening in the cooler (drain plug) from the inside to ensure control of interior contents Also, tape the drain plug from the outside of the cooler
- All sample containers will be properly labeled and the label protected with waterproof tape prior to sampling
- At a minimum the label must contain
  - Project name
  - Project number
  - Date and time of sample collection
  - Sample location
  - Sample identification number
  - Collector s initials
  - Preservative (note amount of preservative used in miscellaneous section of the chain-of-custody)

- This step is optional, wrap each container in bubble wrap (secure with waterproof tape) to prevent breakage
- Place the bubble wrapped container into a 2 7 mil Ziploc®-type bag removing trapped air
- Place glass containers inside a polyethylene bottle filled with vermiculite, seal the bottle
- Place sufficient amount of vermiculite in the bottom of the cooler to absorb any leakage that may occur
- Place a garbage bag in the cooler
- Pack the samples appropriately inside the garbage bag (bottles placed upright) to prevent movement during shipment
- Place a sufficient amount of double bagged ice around the samples to maintain the required temperature during shipment
- Seal the garbage bag by tying or taping
- The maximum weight of the cooler shall not exceed 30 kg (66 lbs) for any limited quantity shipment of dangerous goods
- Secure the chain-of-custody form (placed inside a Ziploc®-type bag) to the interior of the cooler lid
- If the shipment is from a DOE or other facility, place the results of the radiation screen and cooler/sample survey with the chain-of-custody
- Wrap strapping tape or duct tape around both ends of the cooler and around the cooler lid
- Affix custody seals to opposite sides of the cooler lid Cover the custody seals with clear waterproof tape
- Mark the outside of the cooler with the proper shipping name of the contents corresponding UN number, and LTD QTY (as shown below)

NITRIC ACID SOLUTION (with less then 20%)
UN2031
LTD QTY

- Place a label on the front of the cooler with the company name contact name phone number full street address, and state with zip code for both shipper and recipient
- Affix a Corrosive label to the outside of the cooler
- Affix package orientation labels on two opposite sides of the cooler
- Secure the marking and labels to the surface of the cooler with clear waterproof tape to prevent accidental removal during shipment
- An example of cooler labeling/marking locations is shown in Figure 1

NOTE Samples meeting the exemption concentration of 0 15 percent HNO_3 by weight will be shipped as non-regulated or non-hazardous

NOTE No marking or labeling can be obscured by strapping or duct tape

NOTE The inner packaging of dangerous goods may be placed into the designated cooler for shipment Other non regulated environmental samples may be added to the cooler for shipment

- When shipping from a DOE facility, the cooler will be surveyed by a qualified radiation control technician to ensure the exterior surfaces do not exceed 0 5 mrem/h on all sides This survey will be documented and the results reviewed by the qualified shipper
- Complete the Dangerous Goods and Hazardous Materials Inspection Checklist for Shipping Limited Quantity (Appendix A)
- Complete a Dangerous Goods Airbill

6 0 PACKAGING AND SHIPPING OF SAMPLES PRESERVED WITH SULFURIC ACID

6 1 OBJECTIVE

This section provides guidance for the shipment of soil and water environmental samples regulated under the DOT Hazardous Materials Regulations and the IATA/ICAO Dangerous Goods Regulations for shipment by air and applies only to domestic shipments

6 2 BACKGROUND

6 2 1 Definitions

Section 1 2 1 defines the terms relevant to this section

6 2 2 Transportation

This section was prepared for the shipment of sulfuric acid (H_2SO_4) preserved samples

6 2 3 Containers

The inner packaging container (and amount of preservative) that may be used for these shipments includes

Exempted quantities of preservatives

Preservative		Desired in Final Sample		Quantity of Preservative (ml) for Specified Container				
		pH	Conc	40 ml	125 ml	250 ml	500 ml	1 L
H_2SO_4	37N	<2	0 35%	1	25	0 5	1	2

5 drops = 1 ml

6 3 RESPONSIBILITY

It is the responsibility of the qualified shipper to determine the amount of preservative in each sample so that accurate determination of quantities can be made

6 4 REQUIRED EQUIPMENT

- Outer packaging (for limited quantities) insulated cooler that has passed the performance test
- Garbage bags
- Clear tape
- Duct tape
- Strapping tape (optional)
- Ziploc®-type bags, small and large
- Vermiculite (or equivalent)*
- Bubble wrap
- Ice
- Custody seals
- Chain-of-custody form
- Survey documentation (if shipping from Department of Energy [DOE] or radiological sites)
- Class 8 corrosive labels
- Orientation labels
- Consignor/consignee labels

* Check for any client-specific or laboratory requirements related to the use of absorbent packaging materials

6 5 PACKAGING

Samples containing H_2SO_4 as a preservative that exceed the exempted concentration of 0 35 percent will be shipped as a limited quantity per packing instruction Y809 of the IATA/ICAO Dangerous Goods Regulations

The following steps are to be followed when packaging limited quantity samples shipments

- Tape any interior opening in the cooler (drain plug) from the inside to ensure control of interior contents Also, tape the drain plug from the outside of the cooler
- All sample containers will be properly labeled and the label protected with waterproof tape prior to sampling
- At a minimum the label must contain
  - Project name
  - Project number
  - Date and time of sample collection

- Sample location
- Sample identification number
- Collector s initials
- Preservative (note amount of preservative used in miscellaneous section of the chain-of-custody)

- Wrap each glass container in bubble wrap (secure with waterproof tape) to prevent breakage
- Place the bubble wrapped container into a 2 7 mil Ziploc® type bag, removing trapped air
- Place glass containers inside a polyethylene bottle filled with vermiculite, seal the bottle
- Place sufficient amount of vermiculite in the bottom of the cooler to absorb any leakage that may occur
- Place a garbage bag in the cooler
- Pack the samples appropriately inside the garbage bag (bottles placed upright) to prevent movement during shipment
- Place a sufficient amount of double-bagged ice around the samples to maintain the required temperature during shipment
- Seal the garbage bag by tying or taping
- The maximum weight of the cooler shall not exceed 30 kg (66 lbs) for any limited quantity shipment of dangerous goods
- Secure the chain-of custody form (placed inside a Ziploc®-type bag) to the interior of the cooler lid
- If the shipment is from a DOE or other facility, place the results of the radiation screen and cooler/sample survey with the chain of custody
- Wrap strapping tape or duct tape around both ends of the cooler and around the cooler lid
- Affix custody seals to opposite sides of the cooler lid Cover the custody seals with clear waterproof tape
- Mark the outside of the cooler with the proper shipping name of the contents corresponding UN number and LTD QTY (as shown below)

SULFURIC ACID SOLUTION
UN2796
LTD QTY

- Place a label on the front of the cooler with the company name, contact name phone number full street address, and state with zip code for both shipper and recipient
- Affix a Corrosive label to the outside of the cooler
- Affix package orientation labels on two opposite sides of the cooler
- Secure the marking and labels to the surface of the cooler with clear waterproof tape to prevent accidental removal during shipment
- An example of cooler labeling/marking locations is shown in Figure 1

NOTE Samples meeting the exemption concentration of 0 35 percent H_2SO_4 by weight will be shipped as non-regulated or non-hazardous

NOTE No marking or labeling can be obscured by strapping or duct tape

NOTE The inner packaging of dangerous goods may be placed into the designated cooler for shipment Other non-regulated environmental samples may be added to the cooler for shipment

- When shipping from a DOE facility, the cooler will be surveyed by a qualified radiation control technician to ensure the exterior surfaces do not exceed 0 5 mrem/h on all sides This survey will be documented and the results reviewed by the qualified shipper
- Complete the Dangerous Goods and Hazardous Materials Inspection Checklist for Shipping Limited Quantity (Appendix A)
- Complete a Dangerous Goods Airbill

7 0 PACKAGING AND SHIPPING OF LIMITED QUANTITY RADIOACTIVE SAMPLES

7 1 OBJECTIVE

This section provides guidance for the shipment of soil and water environmental samples regulated under the DOT Hazardous Materials Regulations and the IATA/ICAO Dangerous Goods Regulations for shipment by air and applies only to domestic shipments

7 2 BACKGROUND

7 2 1 *Definitions*

Section 1 2 1 defines the terms relevant to this section

7 2 2 Transportation

This section was prepared for the shipment of environmental samples containing radioactive materials in limited quantities

7 2 3 Containers

The inner packaging containers that may be used for these shipments include

- Any size sample container

7 3 DESCRIPTION/RESPONSIBILITIES

- The qualified shipper will ship all samples that meet the Class 7 definition of radioactive materials and meet the activity requirements specified in Table 7 of 49 CFR 173 42ɔ, as Radioactive Materials in Limited Quantity The qualified shipper will verify that all packages and their contents meet the requirements of 49 CFR 173 421 Limited Quantities of Radioactive Materials '
- The packaging used for shipping will meet the general requirements for packaging and packages specified in 49 CFR 173 24 and the general design requirements provided in 173 410 These standards state that a package must be capable of withstanding the effects of any acceleration vibration, or vibration resonance that may arise under normal condition of transport without any deterioration in the effectiveness of the closing devices on the various receptacles or in the integrity of the package as a whole and without loosening or unintentionally releasing the nuts bolts or other securing devices even after repeated use
- If the shipment is from a Department of Energy (DOE) facility radiological screenings will be completed on all samples taken The qualified shipper will review the results of each screening (alpha beta and gamma speciation) Samples will not be shipped offsite until the radiological screening has been performed
- The total activity for each package will not exceed the relevant limits listed in Table 7 of 49 CFR 173 425 The A_2 value of the material will be calculated based on all radionuclides found during previous investigations (if any) in the area from which the samples are derived The A_2 values to be used will be the most restrictive of all potential radionuclides as listed in 49 CFR 173 435
- The radiation level at any point on the external surface of the package bearing the sample(s) will not exceed 0 00ɔ mSv/hour (0 ɔ mrem/hour) These will be verified by dose and activity monitoring prior to shipment of the package
- The removable radioactive surface contamination on the external surface of the package will not exceed the limits specified in 49 CFR 173 443(a) CDM Federal will use the DOE established free release criteria for removable surface contamination of less than 20 dpm/100 cm^2 (alpha) and 1000 dpm/100 cm^2 (beta/gamma) It should be noted that these values are more conservative than the DOT requirements for removable surface contamination
- The qualified shipper will verify that the outside of the inner packaging is marked Radioactive
- The qualified shipper will verify that the excepted packages prepared for shipment under the provisions of 49 CFR 173 421 have a notice enclosed, or shown on the outside of the package that reads, This package conforms to the conditions and limitations specified in 49 CFR 173 421 for radioactive material, excepted package limited quantity of material UN2910

7 4 REQUIRED EQUIPMENT

- Cooler or other acceptable outer packaging
- Garbage bags
- Clear tape
- Duct tape
- Strapping tape (optional)
- Ziploc®-type bags, small and large
- Vermiculite (for water samples) or equivalent*
- Bubble wrap (optional)
- Ice (if necessary)
- Custody seals
- Chain-of-custody form
- Survey documentation/radiation screening results (if shipping from DOE or radiological sites)
- Orientation labels
- Exempted quantities label
- Consignor/consignee labels

* Check for any client-specific or laboratory requirements related to the use of absorbent packaging materials

7 5 PACKAGING

The following steps are to be followed when packaging limited quantity samples shipments

- The cooler is to be surveyed by a qualified radiation control technician to ensure the exterior surfaces do not exceed 0 5 mrem/h on all sides This survey will be documented and the results reviewed by the qualified shipper
- Tape any interior opening in the cooler (drain plug) from the inside to ensure control of interior contents Also, tape the drain plug from the outside of the cooler
- All sample containers will be properly labeled and the label protected with waterproof tape prior to sampling
- At a minimum the label must contain
  - Project name
  - Project number
  - Date and time of sample collection
  - Sample location
  - Sample identification number
  - Collector's initials
- This step is optional, wrap each container in bubble wrap (secure with waterproof tape) to prevent breakage

- Place sufficient amount of vermiculite or approved packaging material in the bottom of the cooler to absorb any leakage that may occur
- Place a garbage bag in the cooler
- Pack the samples appropriately inside the garbage bag (bottles placed upright) to prevent movement during shipment
- If required place a sufficient amount of double bagged ice around the samples to maintain the required temperature during shipment
- Seal the garbage bag by tying or taping
- Place a label marked Radioactive on the outside of the sealed bag
- Enclose a notice that includes the name of the consignor or consignee and the following statement This package conforms to the conditions and limitations specified in 49 CFR 173 421 for radioactive material, excepted package-limited quantity of material UN2910
- The maximum weight of the package shall not exceed 30 kg (66 lbs) for any limited quantity shipment of dangerous goods
- Secure the chain-of custody form (placed inside a Ziploc®-type bag) to the interior of the cooler lid
- If the shipment is from a DOE or other facility place the results of the radiation screen and cooler/sample survey with the chain of-custody
- If a cooler is used wrap strapping tape or duct tape around both ends of the cooler and around the cooler lid
- Affix custody seals to opposite sides of the cooler lid Cover the custody seals with clear waterproof tape
- Place a label on the front of the cooler with the company name contact name phone number full street address, and state with zip code for both shipper and recipient
- Affix package orientation labels on two opposite sides of the cooler/package
- Affix a completed Excepted Quantities label to the side of the cooler/package
- Secure any marking and labels to the surface of the cooler with clear waterproof tape to prevent accidental removal during shipment
- An example of the cooler labeling/marking is shown in Figure 2

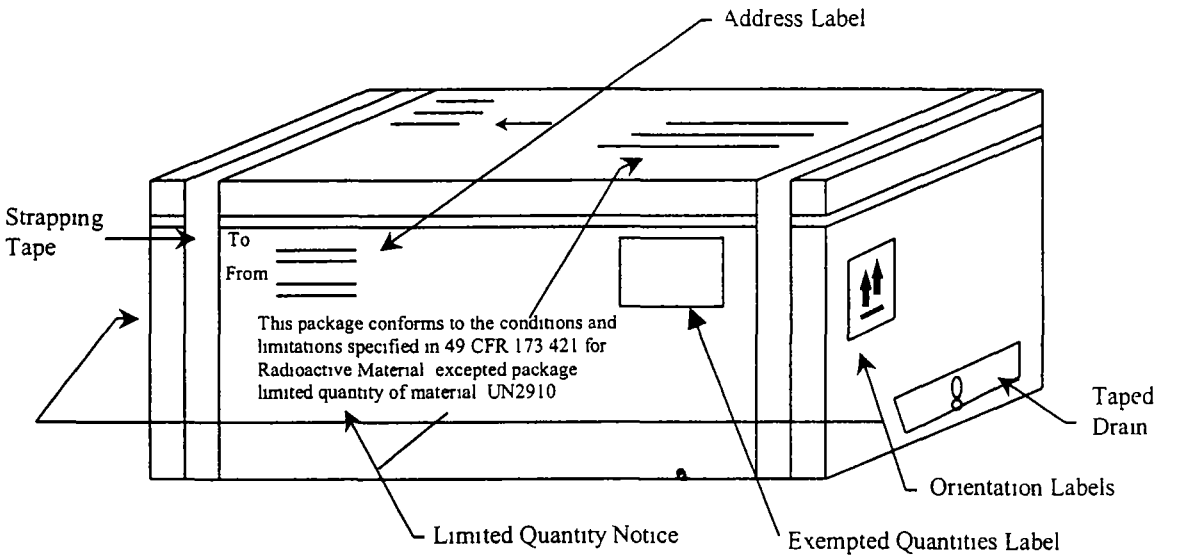
NOTE No marking or labeling can be obscured by strapping or duct tape

- Complete the Shipment Quality Assurance Checklist (Appendix B)

NOTE Except as provided in 49 CFR 173 426 the package will not contain more than 15 grams of ^{235}U

NOTE A declaration of dangerous goods is not required

Figure 2 Radioactive Material - Limited Quantity Cooler Marking Example



8 0 REFERENCES

U S Environmental Protection Agency, *Sampler's Guide to the Contract Laboratory Program*, EPA/540/P-90/006, December 1990

U S Environmental Protection Agency, Region IV, *Standard Operating Procedures and Quality Assurance Manual*, February 1991

APPENDIX A
Dangerous Goods and Hazardous Materials Inspection Checklist for Shipping Limited Quantity

Sample Packaging

Yes	No	N/A	
❑	❑	❑	The VOA vials are wrapped in bubble wrap and placed inside a Ziploc® type bag
❑	❑	❑	The VOA vials are placed into a polyethylene bottle filled with vermiculite and tightly sealed
❑	❑	❑	The drain plug is taped inside and outside to ensure control of interior contents
❑	❑	❑	The samples have been placed inside garbage bags with sufficient bags of ice to preserve samples at 4°C
❑	❑	❑	The cooler exceeds the 66 pound limit for limited quantity shipment
❑	❑	❑	The garbage bag has been sealed with tape (or tied) to prevent movement during shipment
❑	❑	❑	The chain of custody has been secured to the interior of the cooler lid
❑	❑	❑	The cooler lid and sides have been taped to ensure a seal
❑	❑	❑	The custody seals have been placed on both the front and back hinges of the cooler using waterproof tape

Air Waybill Completion

Yes	No	N/A	
❑	❑	❑	Section 1 has the shipper s name company and address the account number date internal billing reference number and the telephone number where the shipper can be reached.
❑	❑	❑	Section 2 has the recipient s name and company along with a telephone number where they can be reached
❑	❑	❑	Section 3 has the **Bill Sender** box checked
❑	❑	❑	Section 4 has the **Standard Overnight** box checked
❑	❑	❑	Section 5 has the **Deliver Weekday** box checked
❑	❑	❑	Section 6 has the number of packages and their weights filled out Was the total of all packages and their weights figured up and added at the bottom of Section 6?
❑	❑	❑	Under the **Transport Details** box the **Cargo Aircraft Only** box is obliterated, leaving only the **Passenger and Cargo Aircraft** box
❑	❑	❑	Under the **Shipment Type** the **Radioactive** box is obliterated, leaving only the **Non-Radioactive** box
❑	❑	❑	Under the **Nature and Quantity of Dangerous Goods** box the **Proper Shipping Name, Class or Division, UN or ID No , Packing Group, Subsidiary Risk, Quantity and Type of Packing, Packing Instructions and Authorization** have been filled out for the type of chemical being sent
❑	❑	❑	The **Name, Place & Date, Signature, and Emergency Telephone number** appears at the bottom of the FedEx Airbill
❑	❑	❑	The statement In accordance with IATA/ICAO appears in the **Additional Handling Information** box

Proper Shipping Name	Class or Division	UN or ID No	Packing Group	Sub Risk	Quantity	Packing Instruction	Authorization
Hydrochloric Acid Solution	8	UN1789	II		1 plastic box × 0 5 L	Y809	LTD QTY
Nitric Acid Solution (with less than 20%)	8	UN2031	II		1 plastic box × 0 5 L	Y807	LTD QTY
Sodium Hydroxide Solution	8	UN1824	II		1 plastic box × 0 5 L	Y809	LTD QTY
Sulfuric Acid Solution	8	UN2796	II		1 plastic box × 0 5 L	Y809	LTD QTY
Hexanes	3	UN1208	II		1 plastic box × 1 L	Y305	LTD QTY

Sample Cooler Labeling

Yes	No	N/A	
❑	❑	❑	The proper shipping name UN number and LTD QTY appears on the shipping container
❑	❑	❑	The corresponding hazard labels are affixed on the shipping container the labels are not obscured by tape
❑	❑	❑	The name and address of the shipper and receiver appear on the top and side of the shipping container
❑	❑	❑	The air waybill is attached to the top of the shipping container
❑	❑	❑	**Up Arrows** have been attached to opposite sides of the shipping container
❑	❑	❑	Packaging tape does not obscure markings or labeling

APPENDIX B
SHIPMENT QUALITY ASSURANCE CHECKLIST

Date _____ Shipper _____ Destination _____

Item(s) Description _____

Radionuclide(s) _____

Radiological Survey Results surface _____mrem/hr 1 meter _____

Instrument Used Mfgr _____ Model _____

S/N _____ Cal Date _____

LIMITED QUANTITY OR INSTRUMENT AND ARTICLE

Yes	No		
___	___	1	Strong tight package (package that will not leak material during conditions normally incidental to transportation)
___	___	2	Radiation levels at any point on the external surface of package less than or equal to 0 5 mrem/hr
___	___	3	Removable surface contamination less than 20 dpm/100 cm^2 (alpha) and 1000 dpm/100 cm^2 (beta/gamma)
___	___	4	Outside inner package bears the marking Radioactive
___	___	5	Package contains less than 1ɔ grams of ^{233}U (check yes if ^{235}U not present)
___	___	6	Notice enclosed in or on the package that includes the consignor or consignee and the statement This package conforms to the conditions and limitations specified in 49 CFR 173 421 for radioactive material excepted package limited quantity of material UN2910
___	___	7	Activity less than that specified in 49 CFR 173 42ɔ Permissible package limit Package Quantity
___	___	8	On all air shipments, the statement Radioactive Material, excepted package limited quantity of material shall be noted on the air waybill

Qualified Shipper _____ Signature _____

Project Specific Modification

SOP No 2 2

SOP Title Guide to Handling Investigation-Derived Waste

Project Libby Asbestos Remedial Investigation - Contaminant Screening Study

Project No 3282-116

Client U S Environmental Protection Agency

Project Manager _____ Date April 4, 2002

Technical Reviewer _____ Date 4/5/02

QA Reviewer _____ Date 4/5/02

Reason for and duration of modification Site-specific procedures for disposing of Libby amphibole asbestos contaminated IDW are different than CDM Technical SOP 2 2 These modifications are necessary for the entire duration of the project

All IDW will be handled in accordance with CDM Technical SOP 2-2, Guide to Handling Investigation-Derived Waste, with the following modifications

Section 5 2, Off Site Disposal - All IDW (not including excess soil volume) will be collected in transparent garbage bags and marked "IDW" with an indelible marker These bags will be deposited into the asbestos contaminated waste stream for deposal at the mine

GUIDE TO HANDLING INVESTIGATION-DERIVED WASTE

SOP 2 2
Revision 3
Date June 20 2001

Prepared Tim Eggert Technical Review Mike Profit

QA Review Krista Lippoldt Approved _____ Signature/Date 6/29/01

Issued _____ Signature/Date 6/29/01

1 0 OBJECTIVE

This standard operating procedure (SOP) presents guidance for the management of investigation-derived waste (IDW) The primary objectives for managing IDW during field activities include

- Leaving the site in no worse condition than existed prior to field activities
- Remove wastes which pose an immediate threat to human health or the environment
- Proper handling of onsite wastes that do not require off site disposal or extended above ground containerization
- Complying with federal state, and facility applicable or relevant and appropriate requirements (ARARs)
- Careful planning and coordination of IDW management options
- Minimizing the quantity of IDW

2 0 BACKGROUND

2 1 Definitions

Hazardous Waste – Discarded material that is regulated listed waste or waste that exhibits ignitability corrosivity reactivity, or toxicity as defined in 40 CFR 261 3 or state regulations

Investigation Derived Wastes (IDWs) Discarded materials resulting from field activities such as sampling surveying, drilling, excavations, and decontamination processes that, in present form possess no inherent value or additional usefulness without treatment Wastes may be solid liquid or gaseous, or multiphase materials that may be classified as hazardous or non-hazardous

Mixed Waste Any material that has been classified as hazardous and radioactive

Radioactive Wastes – Discarded materials that are contaminated with radioactive constituents with specific activities in concentrations greater than the latest regulatory criteria (i e , 10 CFR 20)

Treatment, Storage, and Disposal Facility (TSDF) - Permitted facilities which accept hazardous waste shipments for further treatment, storage and/or disposal These facilities must be permitted by the U S Environmental Protection Agency (EPA) and appropriate state agencies

2 2 Discussion

Field investigation activities result in the generation of waste materials that may be characterized as a hazardous or radioactive waste IDWs may include drilling muds, cuttings, and purge water from test pit and well installation, purge water, soil, and other materials from collection of samples residues from testing of treatment technologies and pump and treat systems, personal protective equipment (PPE), solutions (aqueous or otherwise) used to decontaminate non-disposable protective clothing and equipment, and other wastes or supplies used in sampling and testing potentially hazardous or radiologically contaminated material

NOTE The client's representatives may not be aware of all potential contaminants The management of IDW must comply with regulatory requirements that are applicable

3 0 RESPONSIBILITIES

Site Manager - The site manager is responsible for ensuring that all IDW procedures are conducted in accordance with this SOP The site manager is also responsible for ensuring that handling of IDW is in accordance with site-specific requirements

Project Manager - The project manager is responsible for identifying site-specific requirements for the disposal of IDW in accordance with federal, state, and/or facility requirements

Field Crew Members - Field crew members are responsible for implementing this SOP and communicating any unusual or unplanned condition to the project manager's attention

4 0 REQUIRED EQUIPMENT

Equipment required for IDW containment will vary according to site-specific/client requirements Management decisions concerning the necessary equipment required should consider containment method, sampling, labeling, maneuvering, and storage (if applicable) Equipment must be on site and inspected before commencing work

4 1 IDW Containment Devices

The appropriate containment device (drums, tanks, etc) will depend on site- or client specific requirements and the ultimate disposition of the IDW Typical IDW containment devices can include

- Plastic sheeting (polyethylene) with a minimum thickness of 20 millimeters
- Department of Transportation (DOT) approved steel containers
- Bulk storage tanks comprised of polyethylene or steel

Containment of IDW should be segregated by waste type (i e solid or liquid corrosive or flammable etc) and source location Volume of the appropriate containment device should be site specific

4 2 IDW Container Labeling

A Waste Container" or IDW Container' label or indelible marking should be applied to each container Labeling or marking requirements for onsite IDW not expected to be transported off site are

- Labels and markings that contain the following information project name generation date, location of waste origin container identification number sample number (if applicable) contents (drill cuttings purge water PPE, etc)
- Each label or marking will be applied to the upper one third of the container at least twice, on opposite sides
- Containers that are five gallons or less may only require one label or set of markings
- Labels or markings will be positioned on a smooth part of the container The label must not be affixed across container bungs seams ridges, or dents
- Labels must be constructed of a weather-resistive material with markings made with a permanent marker or paint pen and capable of enduring the expected weather conditions If markings are used the color must be easily distinguishable from the drum color
- Labels will be secured in a manner to ensure the label remains affixed to the container

Labeling or marking requirements for IDW expected to be transported off site must be in accordance with the requirements of 49 CFR 172

4 3 IDW Container Movement

Staging areas for IDW containers should be predetermined and in accordance with site-specific and/or client requirements Arrangements should be made prior to field mobilization as to the methods and personnel required to safely transport IDW containers to the staging area Transportation off site onto a public roadway is prohibited unless 49 CFR 172 requirements are met

4 4 IDW Container Storage

Containerized IDW should be staged pending chemical analysis or further onsite treatment Staging areas and bulk storage procedures are to be determined according to site-specific requirements Containers are to be stored in such a fashion that the labels can be easily read A secondary/spill container must be provided as appropriate

5 0 PROCEDURES

The three general options for managing IDW are (1) collection and onsite disposal, (2) collection for off site disposal, and (3) collection and interim management Attachment 1 summarizes media-

specific information on generation processes and management options The option selected should take into account the following factors

- Type (soil, sludge, liquid, debris), quantity, and source of IDW
- Risk posed by managing the IDW on site
- Compliance with regulatory requirements
- IDW minimization and consistency with the IDW remedy and the site remedy

In all cases the client should approve the plans for IDW Formal plans for the management of IDW must be prepared as part of a work plan or separate document

5 1 Onsite Disposal

5 1 1 Soil/Sludge/Sediment

The options for handling soil/sludge/sediment IDW are as follows

1 Return to boring, pit, or source immediately after generation as long as returning the media to these areas will not increase site risks (e g , the contaminated soil will not be replaced at a greater depth than where it was originally so that it will not contaminate clean areas)

2 Spread around boring, pit, or source within the area of contamination (AOC) as long as returning the media to these areas will not increase site risks (e g , direct contact with surficial contamination)

3 Consolidate in a pit within the AOC as long as returning the media to these areas will not increase site risks (e g , the contaminated soil will not be replaced at a greater depth than where it was originally so that it will not contaminate 'clean areas)

4 Send to onsite TSDF - may require analytical analysis prior to treatment/disposal

NOTE These options may require client and/or regulatory approval

5 1 2 Aqueous Liquids

The options for handling aqueous liquid IDW are as follows

1 Discharge to surface water, only when IDW is not contaminated

2 Discharge to ground surface close to the well, only if soil contaminants will not be mobilized in the process and the action will not contaminate clean areas If IDW from the sampling of background up-gradient wells is not a community concern nor associated with soil contamination, this presumably uncontaminated IDW may be released on the ground around the well

3 Discharge to sanitary sewer

4 Send to onsite TSDF - may require analysis prior to treatment/disposal

NOTE These options may require analytical results to obtain client and/or regulatory approval

5 1 3 Disposable PPE

The options for handling disposable PPE are as follows

1 Double bag contents in non-transparent trash bags and place in onsite industrial dumpster only if PPE is not contaminated

2 Containerize label and send to onsite TSDF - may require analysis prior to treatment/ disposal

5 2 Off Site Disposal

Before sending to an offsite TSDF, analysis may be required Also manifests are required Arrangements must be made with the client responsible for the site it is CDM Federal s policy not to sign manifests The TSDF and transporter must be permitted for the respective wastes

5 2 1 Soil/Sludge/Sediment

When the final site remedy requires off site treatment and disposal the IDW may be stored (e g drummed covered in a waste pile) or returned to its source until final disposal The management option selected should take into account the potential for increased risks applicable regulations and other relevant site-specific factors (e g weather storage space, and public concern/perceptions)

5 2 2 Aqueous Liquids

When the final site remedy requires off site treatment and disposal the IDW may be stored (e g mobile tanks or drums) until final disposal The management option selected should take into account the potential for increased risks, applicable regulations, and other relevant site specific factors (e g , weather storage space and public concern/perceptions)

5 2 3 Disposable PPE

When the final site remedy requires off site treatment disposal the IDW may be containerized and stored The management option selected should take into account potential for increased risks, applicable regulations, and other relevant site-specific factors (e g , weather, storage space and public concern/perceptions)

5 3 Interim Measures

All interim measures must be approved by the client and regulatory agencies

1 Storing IDW on site until the final action may be practical in the following situations

A Returning wastes (especially sludges and soils) to their onsite source area would require re-excavation for disposal in the final remediation alternative

B Interim storage in containers may be necessary to provide adequate protection to human health and the environment

C Off site disposal options may trigger land disposal regulations under the Resource Conservation and Recovery Act (RCRA) Storing IDW until the final disposal of all wastes from the site will eliminate the need to address this issue more than once

D Interim storage may be necessary to provide time for sampling and analysis

2 Segregate and containerize all waste for future treatment and/or disposal

A Containment options for soil/sludge/sediment may include drums or covered waste piles in AOC

B Containment options for aqueous liquids may include mobile tanks or drums

C Containment options for PPE may include drums or roll-off boxes

6 0 RESTRICTIONS/LIMITATIONS

SITE MANAGERS SHOULD DETERMINE THE MOST APPROPRIATE DISPOSAL OPTION FOR AQUEOUS LIQUIDS ON A SITE-SPECIFIC BASIS Parameters to consider especially when determining the level of protection, include the volume of IDW, the contaminants present in the groundwater, the presence of contaminants in the soil at the site, whether the groundwater or surface water is a drinking water supply, and whether the groundwater plume is contained or moving Special disposal/handling may be needed for drilling fluids because they may contain significant solid components

Disposable sampling materials, disposable PPE, decontamination fluids, etc will always be managed on a site-specific basis **UNDER NO CIRCUMSTANCES SHOULD THESE TYPES OF MATERIALS BE BROUGHT BACK TO THE OFFICE OR WAREHOUSE**

7 0 REFERENCES

Environmental Resource Center, *Hazardous Waste Management Compliance Handbook* Van Nostrand Reinhold 1992

Institute of Hazardous Materials Management *Handbook on Hazardous Materials Management* 4th Ed 1992

U S Environmental Protection Agency Region IV *Environmental Investigations Standard Operating Procedures and Quality Assurance Manual* May 1996 and 1997 revisions

U S Environmental Protection Agency *A Compendium of Superfund Field Operations Methods* EPA/540/P-87/001 1 1987

U S Environmental Protection Agency *Management of Investigation-Derived Wastes During Site Inspections* EPA/540/G-91/009 May 1991

U S Environmental Protection Agency *Low Level Mixed Waste A RCRA Perspective for NRC Licensees* EPA/530-SW 90-057 August 1990

U S Environmental Protection Agency *Guide to Management of Investigation Derived Wastes* 9345 3-03FS, January 1992

ATTACHMENT 1
IDW MANAGEMENT OPTIONS

TYPE OF IDW	GENERATION PROCESSES	MANAGEMENT OPTIONS
Soil	• Well/Test pit installations • Borehole drilling • Soil sampling	**Onsite Disposal** • Return to boring pit or source immediately after generation • Spread around boring pit or source within the AOC • Consolidate in a pit (within the AOC) • Send to onsite TSDF **Off site Disposal** • Client to send to off site TSDF **Interim Management** • Store for future treatment and/or disposal
Sludge/Sediment	• Sludge pit/sediment sampling	**Onsite Disposal** • Return to boring pit or source immediately after generation • Send to onsite TSDF **Off site Disposal** • Client to send to off site TSDF **Interim Management** • Store for future treatment and/or disposal
Aqueous liquids (groundwater surface water drilling fluids wastewaters)	• Well installation/development • Well purging during sampling • Groundwater discharge during pump tests • Surface water sampling • Waste water sampling	**Onsite Disposal** • Pour onto ground close to well (non hazardous waste) • Discharge to sewer • Send to onsite TSDF **Off site Disposal** • Client to send to off site commercial treatment unit • Client to send to publicly owned treatment works (POTW) **Interim Management** • Store for future treatment and/or disposal
Decontamination fluids	• Decontamination of PPE and equipment	**Onsite Disposal** • Send to onsite TSDF • Evaporate (for small amounts of low contamination organic fluids) • Discharge to ground surface **Off site Disposal** • Client to send to off site TSDF • Discharge to sewer **Interim Management** • Store for future treatment and/or disposal

ATTACHMENT 1
IDW MANAGEMENT OPTIONS

TYPE OF IDW	GENERATION PROCESSES	MANAGEMENT OPTIONS
Disposable PPE and Sampling Equipment	• Sampling procedures or other onsite activities	**Onsite Disposal** • Place in onsite industrial dumpster • Send to onsite TSDF **Off site Disposal** • Client to send to off site TSDF ***Interim Management*** • Store for future treatment and/or disposal

Adapted from U S Environmental Protection Agency Guide to Management of Investigation Derived Wastes 9345 03FS January 1992

FIELD LOGBOOK CONTENT AND CONTROL

Prepared Del Baird

Technical Review Larry Davidson

QA Review David O Johnson

Approved
Signature/Date

Issued
Signature/Date

1 0 OBJECTIVE

The objective of this standard operating procedure (SOP) is to set CDM Federal criteria for content entry and form of field logbooks Field logbooks are an essential tool to document field activities for historical and legal purposes

2 0 BACKGROUND

2 1 Definitions

Biota The flora and fauna of a region

Magnetic Declination Corrections - Compass adjustments to correct for the angle between magnetic north and geographical meridians

2 2 Discussion

Information recorded in field logbooks includes field team names, observations, data calculations, date/time, weather and description of the data collection activity methods instruments and results Additionally, the logbook may contain deviations from plans and descriptions of wastes, biota geologic material, and site features including sketches, maps, or drawings as appropriate

3 0 RESPONSIBILITIES

Field Team Leader (FTL) - The FTL is responsible for ensuring that the format and content of data entries are in accordance with this procedure

Site Personnel - All CDM Federal employees who make entries in field logbooks during onsite activities are required to read this procedure prior to engaging in this activity The FTL will assign field logbooks to site personnel who will be responsible for their care and maintenance Site personnel will return field logbooks to the records file at the end of the assignment

4 0 REQUIRED EQUIPMENT

- Site specific plans
- Field notebook
- Indelible black or blue ink pen
- Ruler or similar scale

5 0 PROCEDURES

5 1 Preparation

In addition to this SOP, site personnel responsible for maintaining logbooks must be familiar with all procedures applicable to the field activity being performed These procedures should be consulted as necessary to obtain specific information about equipment and supplies health and safety sample collection packaging, decontamination and documentation These procedures should be located at the field office

Field logbooks shall be bound with lined, consecutively numbered pages All pages must be numbered prior to initial use of the logbook Prior to use in the field each logbook will be marked with a specific document control number issued by the document control administrator if required by the contract quality implementation plan (QIP) Not all contracts require document control numbers The following information shall be recorded on the cover of the logbook

- Field logbook document control number
- Activity (if the logbook is to be activity specific) and location
- Name of CDM Federal contact and phone number(s)
- Start date
- In specific cases, special logbooks may be required (e g , waterproof paper for storm water monitoring)

The first few (approximately five) pages of the logbook will be reserved for a table of contents (TOC) Mark the first page with the heading and enter the following

TABLE OF CONTENTS

Date/Description	Page
(Start Date)/Reserved for TOC	1 5

The remaining pages of the table of contents will be designated as such with "TOC ' written on the top center of each page

5 2 Operation

The following is a list of requirements that must be followed when using a logbook

- Record work, observations, quantities of materials, calculations, drawings and related information directly in the logbook If data collection forms are specified by an activity specific plan, this information need not be duplicated in the logbook However, any forms used to record site information must be referenced in the logbook
- Do not start a new page until the previous one is full or has been marked with a single diagonal line so that additional entries cannot be made Use both sides of each page
- Do not erase or blot out any entry at any time Indicate any deletion by a single line through the material to be deleted Initial and date each deletion Take care to not obliterate what was written previously
- Do not remove any pages from the book

Specific requirements for field logbook entries include

- Initial and date each page
- Sign and date the final page of entries for each day
- Initial and date all changes
- Multiple authors must sign out the logbook by inserting the following

  Above notes authored by
  - (Sign name)
  - (Print name)
  (Date)

- A new author must sign and print his/her name before additional entries are made
- Draw a diagonal line through the remainder of the final page at the end of the day
- Record the following information on a daily basis

  Date and time
  Name of individual making entry
  Names of field team and other persons on site
  - Description of activity being conducted including station or location (i e , well, boring, sampling location number) if appropriate
  - Weather conditions (i e , temperature, cloud cover, precipitation, wind direction, and speed) and other pertinent data
  - Level of personal protection to be used

  Serial numbers of instruments
  Required calibration information
  Serial/tracking numbers on documentation (e g , carrier air bills)

Entries into the field logbook shall be preceded with the time (written in military units) of the observation The time should be recorded frequently and at the point of events or measurements that are critical to the activity being logged All measurements made and samples collected must be recorded unless they are documented by automatic methods (e g , data logger) or on a separate form required by an operating procedure In these cases the logbook must reference the automatic data record or form

At each station where a sample is collected or an observation or measurement made a detailed description of the location of the station is required Use a compass (include a reference to magnetic declination corrections) scale or nearby survey markers, as appropriate A sketch of station location may be warranted All maps or sketches made in the logbook should have descriptions of the features shown and a direction indicator It is preferred that maps and sketches be oriented so that north is toward the top of the page Maps, sketches figures, or data that will not fit on a logbook page should be referenced and attached to the logbook to prevent separation

Other events and observations that should be recorded include

- Changes in weather that impact field activities
- Deviations from procedures outlined in any governing documents Also record the reason for any noted deviation
- Problems downtime, or delays
- Upgrade or downgrade of personal protection equipment

5 3 Post-Operation

To guard against loss of data due to damage or disappearance of logbooks completed pages shall be periodically photocopied (weekly, at a minimum) and forwarded to the field or project office Other field records shall be photocopied and submitted regularly and as promptly as possible to the office When possible, electronic media such as disks and tapes should be copied and forwarded to the project office

At the conclusion of each activity or phase of site work, the individual responsible for the logbook will ensure that all entries have been appropriately signed and dated and that corrections were made properly (single lines drawn through incorrect information then initialed and dated) The completed logbook shall be submitted to the records file

6 0 RESTRICTIONS/LIMITATIONS

Field logbooks constitute the official record of onsite technical work, investigations, and data collection activities Their use, control, and ownership are restricted to activities pertaining to specific field operations carried out by CDM Federal personnel and their subcontractors They are documents that may be used in court to indicate dates, personnel, procedures, and techniques employed during site activities Entries made in these notebooks should be factual, clear, precise, and non-subjective Field logbooks, and entries within, are not to be utilized for personal use

7 0 REFERENCES

Sandia National Laboratories, *Procedure for Preparing Sampling and Analysis Plan Site Specific Sampling Plan and Field Operating Procedures*, QA 02-03, Albuquerque Environmental Program Department 3220, Albuquerque, New Mexico, 1991

Sandia National Laboratories, Division 7723, *Field Operation Procedure for Field Logbook Content and Control Environmental Restoration Department*, Albuquerque, New Mexico, 1992

Project-Specific Modification

SOP No 4-2

SOP Title Photographic Documentation of Field Activities

Project Libby Asbestos Remedial Investigation - Contaminant Screening Study (CSS)

Project No 3282-116

Client U S Environmental Protection Agency

Project Manager _____ Date April 5, 2002

Technical Reviewer _____ Date 4/5/02

QA Reviewer _____ Date 4/5/02

Reason for and duration of modification Site-specific procedures for photographs taken by digital cameras are different than the current SOP

All photographs will be recorded in accordance with CDM Technical SOP 4-2, Photographic Documentation of Field Activities, with the following modifications

Section 5 2 2, General Guidelines for Still Photography - A slate is not required for each new roll of film The information for the slate will be recorded in the field logbook The numbers assigned by the digital camera will be used instead of the photographer assigning the number The caption information will either be on the back of the photograph or the photograph will be numbered or labeled and the caption information listed next to the number or label in the photograph log On the digital photos, a caption will be included in the picture stating property address/location, date, and name of feature All team members, as stated in the logbook, will be photographers and witnesses at the property Slates are not required for close up photographs Instead the required information can be listed in the logbook or photograph log A color strip is not required for close-up or feature photographs

Section 5 2 4, Photographic Documentation - The name of the laboratory, time and date of drop-off, and receipt of film is not required to be recorded for this project

Section 5 3 2, Archive Procedures - Digital photographs will be archived on compact discs These discs will be assigned a document control dumber written on the disc case as well as well as the disc

PHOTOGRAPHIC DOCUMENTATION OF FIELD ACTIVITIES

Prepared David O Johnson Technical Review Jackie Mosher

QA Review Doug Updike Approved
Signature/Date

Issued Rose Mary Fiorentino 10/12/01
Signature/Date

1 0 OBJECTIVE

The purpose of this standard operating procedure (SOP) is to provide standard guidelines and methods for photographic documentation, which include still and digital photography and videotape recordings of field activities and site features (geologic formations core sections, lithologic samples, water samples, general site layout, etc) This document shall provide guidelines designed for use by a professional or amateur photographer This SOP is intended for circumstances when formal photographic documentation is required Based on project requirements, it may not be applicable for all photographic activities

2 0 BACKGROUND

2 1 Definitions

Photographer – A photographer is the camera operator (professional or amateur) of still photography including digital photography, or videotape recording whose primary function with regard to this SOP is to produce documentary or data-oriented visual media

Identifier Component – Identifier components are visual components used within a photograph such as visual slates, reference markers, and pointers

Standard Reference Marker – A standard reference marker is a reference marker that is used to indicate a feature size in the photograph and is a standard length of measure, such as a ruler meter stick etc In limited instances, if a ruled marker is not available or its use is not feasible, it can be a common object of known size placed within the visual field and used for scale

Slates – Slates are blank white index cards or paper used to present information pertaining to the subject/ procedure being photographed Letters and numbers on the slate will be bold and written with black, indelible marking pens

Arrows and Pointers – Arrows and pointers are markers/pointers used to indicate and/or draw attention to a special feature within the photograph

Contrasting Backgrounds – Contrasting backgrounds are backdrops used to lay soil samples, cores, or other objects on for clearer viewing and to delineate features

Data Recording Camera Back – A data recording camera back is a camera attachment or built-in feature that will record, at the very least, frame numbers and dates directly on the film

2 2 Discussion

Photographs and videotape recordings made during field investigations are used as an aid in documenting and describing site features sample collection activities equipment used, and possible lithologic interpretation This SOP is designed to illustrate the format and desired placement of identifier components such as visual slates standard reference markers and pointers These items shall become an integral part of the 'visual media' that, for the purpose of this document shall encompass still photographs digital photographs and videotape recordings (or video footage) The use of a photographic logbook and standardized entry procedures are also outlined These procedures and guidelines will minimize potential ambiguities that may arise when viewing the visual media and ensure the representative nature of the photographic documentation

2 3 Associated Procedures

- CDM Federal SOP 4 1 Field Logbook Content and Control

3 0 RESPONSIBILITIES

Field Team Leader (FTL) – The FTL is responsible for ensuring that the format and content of photographic documentation are in accordance with this procedure The FTL is responsible for directing the photographer to specific situations site features or operations that the photographer will be responsible for documenting

Photographer – The photographer shall seek direction from the FTL and regularly discuss the visual documentation requirements and schedule The photographer is responsible for maintaining a logbook per Sections 5 1 5 2 4 and 5 3 1 of this SOP

4 0 REQUIRED EQUIPMENT

The following is a general list of equipment that may be used

- 35mm camera or disposable single use camera (35mm or panoramic use)
- Digital camera
- Video camera
- Logbook
- Indelible black or blue ink pen
- Standard reference markers
- Slates
- Arrows or pointers

- Contrasting backgrounds
- Medium speed or multi purpose fine grain, color, 35 mm, negative film or slide film (project dependent)
- Data recording camera back (if available)
- Storage medium for digital camera

5 0 PROCEDURES

5 1 Documentation

A commercially available, bound logbook will be used to log and document photographic activities Review the CDM Federal SOP 4-1 (Field Logbook Content and Control) and prepare all supplies needed for logbook entries

Note A separate photographic logbook is not required A portion of the field logbook may be designated as the photographic log and documentation section

5 1 1 Field - Health and Safety Considerations

There are no hazards that an individual will be exposed to specific to photographic documentation However, site-specific hazards may arise depending on location or operation Personal protective equipment used in this operation will be site-specific and dictated through requirements set by the site safety officer, site health and safety plan and/or prescribed by the CDM Federal Corporate Health and Safety Program The photographer should contact the site safety officer for health and safety orientation prior to commencing field activities The site health and safety plan must be read prior to entry to the site, and all individuals must sign the appropriate acknowledgement that this has been done

The photographer should be aware of any potential physical hazards while photographing the subject (e g , low overhead hazard, edge of excavation)

5 2 OPERATION

5 2 1 General Photographic Activities in the Field

The following sections provide general guidelines that should be followed to visually document field activities and site features using still/digital cameras and video equipment Listed below are general suggestions that the photographer should consider when performing activities under this SOP

- The photographer should be prepared to make a variety of shots, from closeup to wide-angle Many shots will be repetitive in nature or format especially closeup site feature photographs Consideration should therefore be given to designing a system or technique that will provide a reliable repetition of performance

- All still film photographs should be made using a medium speed or multi purpose fine grain color negative film in the 35 mm format unless otherwise directed by the FTL
- It is suggested that Kodak brand "Ektapress Gold Deluxe' film or equivalent be used as the standard film for the still photography requirements of the field activities This film is stable at room temperature after exposure and will better survive the time lag between exposure and processing It is suggested that film speed ASA 100 should be used for outdoor photographs in bright sunlight, ASA 200 film should be used in cloudy conditions and ASA 400 film should be used indoors or for very low-light outdoor photographs
- No preference of videotape brand or digital storage medium is specified and is left to the discretion of the photographer
- The lighting for sample and feature photography should be oriented toward a flat condition with little or no shadow If the ambient lighting conditions are inadequate the photographer should be prepared to augment the light (perhaps with reflectors or electronic flash) to maintain the desired visual effect
- Digital cameras have multiple photographic quality settings A camera that obtains a higher resolution (quality) has a higher number of pixels and will store a fewer number of photographs per digital storage medium

5 2 2 General Guidelines for Still Photography

Slate Information

When directed by the FTL each new roll of film or digital storage medium shall contain upon the first usable frame (for film) a slate with consecutively assigned control numbers (a consecutive, unique number that is assigned by the photographer as in sample numbers)

Caption Information

All still photographs will have a full caption permanently attached to the back or permanently attached to a photo log sheet The caption should contain the following information (digital photographs should have a caption added after the photographs are downloaded)

- Film roll control number (if required) and photograph sequence number
- Date and time
- Description of activity/item shown
- Direction (if applicable)
- Photographer

When directed by the FTL a standard reference marker should be used in all documentary visual media While the standard reference marker will predominantly be used in closeup feature documentation, inclusion in all scenes should be considered

Digital media should be downloaded at least once each day

Closeup and Feature Photography

When directed by the FTL, closeup photographs should include a standard reference marker of appropriate size as an indication of the feature size and contain a slate marked with the site name and any identifying label, such as a well number or core depth, that clearly communicates to the viewer the specific feature being photographed

Feature samples, core pieces, and other lithologic media should be photographed as soon as possible after they have been removed from their in situ locations This enables a more accurate record of their initial condition and color When directed by the FTL, include a standard reference color strip (color chart such as Munsell Soil Color Chart or that available from Eastman Kodak Co) within the scene This is to be included for the benefit of the viewer of the photographic document and serves as a reference aid to the viewer for formal lithologic observations and interpretations

Site Photography

Site photography, in general, will consist predominantly of medium and wide-angle shots A standard reference marker should be placed adjacent to the feature or, when this is not possible within the same focal plane

While it is encouraged that a standard reference marker and caption/slate be included in the scene, it is understood that situations will arise that preclude their inclusion within the scene This will be especially true of wide-angle shots In such a case, the film/tape control number shall be entered in the photographic logbook along with the frame number and all other information pertinent to the scene

Panoramic

In situations where a wide-angle lens does not provide sufficient subject detail, a single use disposable panoramic camera is recommended If this type of camera is not available, a panoramic series of two or three photos would be appropriate Panoramas can provide greater detail while covering a wide subject, such as an overall shot of a site

To shoot a panoramic series using a standard 35mm or digital camera, the following procedure is recommended

- Use a stable surface or tripod to support the camera
- Allow a 20 to 30 percent overlap while maintaining a uniform horizon
- Complete 2 to 3 photos per series

5 2 3 General Photographic Documentation Using Video Cameras

As a reminder it is not within the scope of this document to set appropriate guidelines for presentation or "show' videotape recording The following guidelines are set for documentary videotape recordings only and should be implemented at the discretion of the FTL

Documentary videotape recordings of field activities may include an audio slate for all scenes At the beginning of each video session an announcer will recite the following information date time (in military units) photographer site ID number, and site location This oral account may include any additional information clarifying the subject matter being recorded

A standard reference marker may be used when taking closeup shots of site features with a video camera The scene may also include a caption/slate It should be placed adjacent and parallel to the feature being photographed

It is recommended that a standard reference marker and caption/slate be included in all scenes The caption information is vital to the value of the documentary visual media and should be included If it is not included within the scene it should be placed before the scene

Original videotape recordings will not be edited This will maintain the integrity of the information contained on the videotape If editing is desired a working copy of the original videotape recording can be made

5 2 4 Photographic Documentation

Photographic activities must be documented in a photographic logbook or in a section of the field logbook The photographer will be responsible for making proper entries

In addition to following the technical standards for logbook entry as referenced in CDM Federal SOP 4-1 the following information should be maintained in the appropriate logbook

- Photographer name
- If required an entry shall be made for each new roll/tape control number assigned
- Sequential tracking number for each photograph taken (for digital cameras the camera-generated number may be used)
- Date and time (military time)
- Location
- A description of the activity/item photographed
- If needed, a description of the general setup including approximate distance between the camera and the subject may be recorded in the logbook
- Record as much other information as possible to assist in the identification of the photographic document

5 3 Post Operation

All film will be sent for development and printing to a photographic laboratory (to be determined by the photographer) The photographer will be responsible for arranging transport of the film from the field to the photographic laboratory The photographer shall also be responsible for arranging delivery of the negatives and photographs, digital storage medium or videotape to the project management representative

5 3 1 Documentation

At the end of each day's photographic session the photographer(s) will ensure that the appropriate logbook has been completely filled out and maintained as outlined in CDM Federal SOP 4-1

5 3 2 Archive Procedures

1 Photographs and the associated set of negatives, digital media and original unedited documentary videotape recordings will be submitted to the project files and handled according to contract records requirements The FTL will ensure their proper distribution

2 Completed pages of the appropriate logbook will be copied weekly and submitted to the project files

6 0 RESTRICTIONS/LIMITATIONS

This document is designed to provide a set of guidelines for the field amateur or professional photographer to ensure that an effective and standardized program of visual documentation is maintained

It is not within the scope of this document to provide instruction in photographic procedures, nor is it within the scope of this document to set guidelines for presentation or "show" photography

The procedures outlined herein are general by nature The FTL is responsible for specific operational activity or procedure Questions concerning specific procedures or requirements should be directed to the FTL

NOTE Some sites do not permit photographic documentation Check with the site contact for any restrictions

7 0 REFERENCES

U S Army Corps of Engineers *Requirements for the Preparation of Sampling and Analysis Plans EM 200-1 3* February 2001 Appendix F

U S Environmental Protection Agency Region IV, *Environmental Investigations Standard Operating Procedures and Quality Assurance Manual*, Athens, Georgia May 1996

U S Environmental Protection Agency National Enforcement Investigations Center *Multi-Media Investigation Manual* EPA 330/9-89-003-R, Revised March 1992 p 85

Project-Specific Modification

SOP No 4-5

SOP Title Field Equipment Decontamination at Nonradioactive Sites

Project Libby Asbestos Remedial Investigation - Contaminant Screening Study (CSS)

Project No 3282-116

Client U S Environmental Protection Agency

Project Manager _____ Date April 4, 2002

Technical Reviewer _____ Date 4/5/02

QA Reviewer _____ Date 4/5/02

Reason for and duration of modification Site-specific procedures for decontamination of Libby amphibole asbestos contaminated field equipment are different than CDM Technical SOP 4-5 These modifications are necessary for the entire duration of the project

All equipment used to collect, handle, or measure soil samples will be decontaminated in accordance with CDM Technical SOP 4-5, Field Equipment Decontamination at Nonradioactive Sites, with the following modifications

Section 4 0, Required Equipment - Plastic sheeting will not be used during decontamination procedures American Society for Testing and Materials (ASTM) Type II water will not be used Rather, locally available deionized (DI) water will be used

Section 5 0, Procedures - Decontamination water will not be captured and will be discharged to the ground at the property

Section 5 6, Waste Disposal - Decontamination water will not be captured and will not be packaged, labeled, or stored as investigation-derived waste (IDW)

FIELD EQUIPMENT DECONTAMINATION AT NONRADIOACTIVE SITES

Prepared Steven Fundingsland
Technical Review Darwin Nelson 12/27/00
QA Review George DeLullo
Approved
Signature Date
Issued Rose Mary Gustin 12/27/00
Signature/Date

1 0 OBJECTIVE

The objective of this standard operating procedure (SOP) is to describe the procedures required for decontamination of field equipment

2 0 BACKGROUND

2 1 Definitions

Clean Free of visible contamination and when decontamination has been completed in accordance with this SOP

Cross Contamination The transfer of contaminants through equipment or personnel from the contamination source to less contaminated or non-contaminated samples or areas

Decontamination - The process of rinsing or otherwise cleaning the surfaces of equipment to rid them of contaminants and to minimize the potential for cross contamination of samples or exposure of personnel

2 2 Discussion

Decontamination of field equipment is necessary to ensure the quality of samples by preventing cross contamination Further, decontamination reduces health hazards and prevents the spread of contaminants off-site

3 0 RESPONSIBILITIES

Field Team Leader The Field Team Leader (FTL) ensures that field personnel are trained in the performance of this procedure and that decontamination is conducted in accordance with this procedure The FTL may also be required to collect and document rinsate samples to provide quantitative verification that these procedures have been correctly implemented

4 0 REQUIRED EQUIPMENT

- Stiff-bristle scrub brushes
- Plastic buckets and troughs
- Laboratory-grade detergent (low phosphate)
- Nalgene or Teflon Sprayers or wash bottles or 2- to 5-gallon manual-pump sprayer (pump sprayer material must be compatible with the solution used)
- Plastic sheeting
- Disposable wipes, rags or paper towels
- Potable water and/or de-ionized water and/or American Society for Testing and Materials (ASTM) Type II or better, as defined by ASTM Standard Specification for Reagent Water Standard D 1193-77 (re-approved 1983)*
- Gloves, safety glasses, and other protective clothing as specified in the site-specific health and safety plan
- High-pressure pump with soap dispenser or steam-spray unit (for large equipment only)
- Appropriate decontamination solutions pesticide grade or better and traceable to a source (e g 10% and/or 1% nitric acid (HNO_3), acetone, methanol, isopropanol, hexane)
- Tools for equipment assembly and disassembly (as required)
- 55 gallon drums or tanks (as required)
- Pallets for drums or tanks holding decontamination water (as required)

* Potable, de-ionized, and ASTM Type II water may be required to be tested for contaminants before use Check field plan for requirements

5 0 PROCEDURES

All reusable equipment (non-dedicated) used to collect, handle, or measure samples will be decontaminated before coming into contact with any sample Decontamination of equipment will occur either at the central decontamination station or at portable decontamination stations set up at the sampling location, drill sites, or monitoring well locations The centrally located decontamination station will include an appropriately sized bermed area on which equipment decontamination will occur and shall be equipped with a collection system and storage vessels In certain circumstances, berming is not required when small quantities of water are being generated and for some short duration field activities (i e , pre-remedial sampling) Equipment should be transported to the decontamination station in a manner to prevent cross-contamination of equipment and/or area Precautions taken may include enclosing augers in plastic wrap while being transported on a flatbed truck

The decontamination area will be constructed so that contaminated water is either collected directly into appropriate containers (5 gallon buckets or steel wash tubs) or within the berms of the decontamination area which then drains into a collection system Water from the collection system will be transferred into 55-gallon drums or portable tanks for storage Typically decontamination water will be staged until sampling results or waste characterization results are obtained and evaluated and the proper disposition of the waste is determined The exact procedure for decontamination waste disposal should be discussed in the field plan Also decontamination fluids, such as solvents may need to be segregated from other investigation derived wastes

All items that will come into contact with potentially contaminated media will be decontaminated before use and between sampling and/or drilling locations If decontaminated items are not immediately used, they will be covered either with plastic or aluminum foil depending on the size of the item All decontamination procedures for the equipment being used are as follows

General Guidelines

- Potable and de ionized water should be free of all contaminants of concern Following the field plan analytical data from the water source may be required If required, either existing analytical data from the water source supplier (i e municipality bottled water company de ionized water producer) may be obtained or chemical testing may be performed on the selected source
- Soap will be a low phosphate detergent
- Sampling equipment that has come into contact with oil and grease will be cleaned with methanol or other approved alternative to remove the oily material This may be followed by a hexane rinse and then another methanol rinse Regulatory or client requirements will be stated in the field plan
- Decontaminated equipment will be allowed to air dry before being used
- Documentation for all cleaning will be recorded in the appropriate logbook
- All solvents will be pesticide grade or better and traceable to a source The corresponding lot numbers will be recorded in the appropriate logbook
- Gloves boots safety glasses, and any other personnel protective clothing and equipment will be used as specified in the site-specific health and safety plan

5 1 Heavy Equipment Decontamination

Heavy equipment includes drilling rigs and backhoes Follow these steps when decontaminating this equipment

1 Establish a decontamination area with berms that is large enough to fully contain the equipment to be cleaned If available, an existing wash pad or appropriate paved and bermed area may be utilized, otherwise use one or more layers of heavy plastic sheeting to cover the ground surface and berms All decontamination pads should be upwind of the area under investigation

2 With the rig in place, spray areas (rear of rig or backhoe) exposed to contaminated soils using a hot water high-pressure sprayer Be sure to spray down all surfaces, including the undercarriage

3 Use brushes, low phosphate detergent and potable water to remove dirt whenever necessary

4 Remove equipment from the decontamination pad and allow it to air dry before returning it to the work site

5 Record equipment type, date, time, and method of decontamination in the appropriate logbook

6 After decontamination activities are completed, collect all contaminated wastewater, plastic sheeting, and disposable gloves, boots, and clothing in separate containers or receptacles All receptacles containing contaminated items must be properly labeled for disposal as detailed in the field plan Liquids and solids must be drummed separately

5 2 Downhole Equipment Decontamination

Downhole equipment decontamination includes hollow-stem augers, drill pipes, casings, screens etc Follow these steps when decontaminating this equipment

1 Set up a centralized decontamination area, if possible This area should be set up to collect contaminated rinse waters and to minimize the spread of airborne spray

2 Set up a "clean" area upwind of the decontamination area to receive cleaned equipment for air-drying At a minimum, clean plastic sheeting must be used to cover the ground, tables, or other surfaces on which decontaminated equipment is to be placed All decontamination pads should be upwind of any areas under investigation

3 Place the object to be cleaned on aluminum foil or plastic covered wooden sawhorses or other supports

4 Using low phosphate detergent and potable water in the hot water high pressure spraver (or steam unit), spray the contaminated equipment Aim downward to avoid spraying outside the decontamination area Be sure to spray inside corners and gaps especially well Use a brush if necessary, to dislodge dirt

5 If using soapy water, rinse the equipment using clean potable water If using hot water the rinse step is not necessary if the hot water does not contain a detergent If the hot water contains a detergent, this final clean water rinse is required

6 Using the manual pump sprayer rinse the equipment thoroughly with de ionized water (ASTM Type II or better)

7 Remove the equipment from the decontamination area and place in a clean area upwind to air dry

8 Record equipment type date time and method of decontamination in the appropriate logbook

9 After decontamination activities are completed, collect all contaminated wastewaters plastic sheeting, and disposable gloves boots and clothing in separate containers or receptacles All receptacles containing contaminated items must be properly labeled for disposal Liquids and solids must be drummed separately

5 3 Sampling Equipment Decontamination

Sampling equipment includes split spoons spatulas, and bowls used for sample homogenization that directly contact sample media Follow these steps when decontaminating this equipment

1 Set up a decontamination line on plastic sheeting The decontamination line should progress from dirty" to 'clean ' and have an area located upwind for drying decontaminated equipment At a minimum clean plastic sheeting must be used to cover the ground, tables or the surfaces on which decontaminated equipment is to be placed for drving

2 Before washing disassemble any items that might trap contaminants internally Do not reassemble these items until decontamination and air drying are complete Wash items thoroughly in a bucket of low phosphate detergent and potable water Use a stiff bristle brush to dislodge anv gross contamination (soil or debris)

3 Rinse the item in potable water Rinse water should be replaced as needed, generally when cloudy

4 Using a hand sprayer, wash bottles, or manual-pump sprayer, rinse the item with de ionized water (ASTM Type II or better)

5 If required by the site-specific field plans, rinse the item with 10% nitric acid (for stainless steel, glass, plastic and Teflon), or 1% nitric acid (for items made of low-carbon steel) followed by a de-ionized water (ASTM Type II or better) rinse

NOTE Care should be taken not to get nitric acid on skin or clothing This step should not be used unless required by sampling needs as dictated in the field plan

CAUTION Do not allow nitric acid to contact methanol or hexane Contain nitric acid waste separate from organic solvents

6 If sampling for organic analytes, rinse the item with methanol or approved organic solvent

7 Rinse the item with de-ionized water (ASTM Type II or better)

8 If required by the field plan, when sampling for polar organic compounds such as pesticides, polychlorinated biphenyls (PCBs), and fuels, rinse the item with hexane or approved alternatives, followed by a second methanol rinse

9 Allow the item to air dry completely

10 After drying, wrap the clean item in plastic wrap or in aluminum foil, shiny side out

11 Record equipment type, date, time, and method of decontamination in the appropriate logbook

12 After decontamination activities are completed, collect all contaminated waters, used solvents and acids, plastic sheeting, and disposable gloves, boots, and clothing Place contaminated items in properly labeled drums for disposal Liquids and solids must be drummed separately (Refer to site-specific plans for labeling and waste management requirements)

5 4 Pump Decontamination

Follow the manufacturer's recommendation for specified pump decontamination procedures At a minimum follow these steps when decontaminating pumps

1 Set up the decontamination area and separate clean' storage area using plastic sheeting to cover the ground tables, and other porous surfaces Set up three 55 gallon drums and one or more containers of ASTM Type II water (or as specified in the field plan) with one drum containing dilute (non foaming) soapy water, the second drum containing potable water, and the third drum receiving waste water

2 The pump should be set up in the same configuration as for sampling Submerge the pump intake (or the pump if submersible) and all downhole wetted parts (tubing piping foot valve) in the soapy water of the first drum Place the discharge outlet in the wastewater drum above the level of the wastewater Pump soapy water through the pump assembly until it discharges to the waste drum

3 Move the pump assembly to the potable water drum while leaving discharge outlet in the waste drum All downhole wetted parts must be immersed in the potable water rinse Pump potable water through the pump assembly until it runs clear

4 Move the pump intake to the ASTM Type II water can Pump the ASTM Type II water through the pump assembly Usually three pump-and-line assembly volumes will be required

5 Decontaminate the discharge outlet by hand following the steps outlined in Section 5 3

6 Remove the decontaminated pump assembly to the "clean area and allow it to air dry upwind of the decontamination area Intake and outlet orifices should be covered with aluminum foil to prevent the entry of airborne contaminants and particles

7 Record the equipment type serial number, date, time, and method of decontamination in the appropriate logbook

5 5 Instrument Probe Decontamination

Instrument probes used for field instruments such as pH meters conductivity meters etc will be decontaminated between samples and after use with ASTM type II, or better water

5 6 Waste Disposal

Refer to site specific plans for waste disposal requirements The following are guidelines for disposing of wastes

1 All wash water, rinse water, and decontamination solutions that have come in contact with contaminated equipment are to be handled, packaged, labeled, marked stored, and disposed of as investigation-derived waste

2 Small quantities of decontamination solutions may be allowed to evaporate to dryness

3 If large quantities of used decontamination solutions will be generated, it may be best to separate each type of waste in a separate container This may permit the disposal of wash water and rinse water onsite or in a sanitary sewage treatment plant rather than as a hazardous waste If an industrial wastewater treatment plant is available onsite, the disposal of acid solutions and solvent-water solutions may be permitted

4 Unless otherwise required, plastic sheeting and disposable protective clothing may be treated as a solid, non-hazardous waste

6 0 RESTRICTIONS/LIMITATIONS

Nitric acid and polar solvent rinses are necessary only when sampling for metals or organics respectively These steps should not be used, unless required, because of acid burn and ignitability hazards

If the field equipment is not allowed to air dry properly before use, volatile organic residue which interferes with the analysis may be detected in the samples The occurrence of residual organic solvents is often dependent on the time of year sampling is conducted, in the summer volatilization is rapid and in the winter, volatilization is slow Check with your EPA region, state and client for approved decontamination solvents

7 0 REFERENCES

Department of Energy, Hazardous Waste Remedial Actions Program *Standard Operating Procedures For Site Characterization*, DOE/HWP 100/R1 September 1996

Department of Energy Hazardous Waste Remedial Actions Program *Quality Control Requirements For Field Methods* DOE/HWP-69/R2, September 1996

American Society for Testing and Materials *Standard Practice for Decontamination of Field Equipment at Nonradioactive Waste Sites*, ASTM D5088-90 June 29 1990

U S Environmental Protection Agency, Region II *CERCLA Quality Assurance Manual*, Revision 1 1989

U S Environmental Protection Agency, Region IV, *Engineering Support Branch Standard Operating Procedures and Quality Assurance Manual* 1986

U S Environmental Protection Agency *A Compendium of Superfund Field Operations Methods*, EPA/540/P 87/001 1 1987

Site-Specific Standard Operating Procedure for Data Validation of Asbestos Results Obtained by Reflectance Spectroscopy for the Contaminant Screening Study of the Libby Asbestos Project

Project Libby Asbestos Remedial Investigation - Contaminant Screening Study (CSS)

Project Number 3282-116

Prepared by Dee Warren DAW — Environmental Specialist — 4/3/02 Date

Approved by _____ — Project Manager — April 4, 2002 Date

_____ — Technical Reviewer — April 4, 2002 Date

_____ — QA Reviewer — 04/04/02 Date

No U S Environmental Protection Agency (EPA) approved criteria currently exists for the validation of asbestos results The following procedures for data validation are based on the EPA Contract Laboratory Program (CLP) National Functional Guidelines for Inorganic Data Review (EPA 1994) and Standard Operating Procedure (SOP) No ISSI-LIBBY-02, Reflectance Spectroscopy Screening for Asbestos in Soil (U S Geological Survey [USGS] 2002) These procedures will be used in the data validation process for results gathered as part of the contaminant screening study (CSS) of the Libby Asbestos Project This is a working document and applicable changes will be made as the validation procedure is implemented

Section 1
Instrument Calibration and Standardization
1 1 Instrument Calibration

Calibration must be successfully completed at the beginning of each sample analysis run and repeated according to the manufacturer s recommendations or when instrument drift is detected Calibration procedures are described in the manufacturer s operating manual for both wavelength and intensity If the laboratory has failed to provide adequate calibration information, the designated representative should contact the laboratory and request the necessary information

Evaluation Verify calibration was performed at the proper frequency

Action Minimum frequency was not met qualify the data as unusable (R)

1 2 Continuing Calibration

An independent reference material must be analyzed for wavelength and intensity with each analytical batch or once a day whichever is more frequent An analytical batch is comprised of 20 field samples The acceptable percent recovery (%R) for continuing calibration criteria is between 80 and 120%R %R is calculated by the following

$$\%R = \frac{\text{Found}}{\text{True}} \times 100$$

Where Found = result of asbestos (percent weight) measured in the reference material

True = result of asbestos (percent weight) in the reference material

Evaluation Verify continuing calibration was performed at the required frequency for both wavelength and intensity

Action Minimum frequency was not met qualify the data as unusable (R)

Evaluation Verify continuing calibration is between 80 and 120%R for both wavelength and intensity

Action

%R	Detected Results Qualifier	Nondetected Results Qualifier
65 79%	J	UJ
121 135%	J	No qualifier
<65%	R	~~No qualifier~~ R
>135%	~~R~~ J Not Rej	No qualifier

1 3 Spectra Standardization

All spectra must be fully corrected to absolute reflectance before any analysis can be performed

Evaluation Verify standardization was performed at the proper frequency

Action Standardization was not performed, qualify the data as unusable (R)

Section 2
Method Blanks

An instrument blank is composed of the field sample matrix that is free of the analyte of interest (e g asbestos-free soil) Method blanks are put through the same sample preparation steps as field samples and are used to discern if laboratory-induced contamination is present ~~Detection of a single asbestos fiber suggests that laboratory-induced contamination is present~~ All associated samples may require re-preparation and re-analysis Method blanks must be analyzed with each analytical batch or once a day whichever is more frequent An analytical batch is comprised of 20 field samples Multiplying the highest concentration of asbestos detected in the method blank times five gives the action level for qualification based on method blank contamination

Evaluation Verify method blank analysis was performed at the required frequency

Action Minimum frequency was not met the validator should use professional judgment to determine if the associated sample results should be qualified

Evaluation Calculate the method blank action level for qualification

Action All detected results less than the action level are qualified as estimated (U)

Section 3
Laboratory Control Sample (LCS)

Laboratory control samples are certified reference standards (independent from the calibration standards) consisting of several asbestiforms Because LCSs are independent of the calibration standards, they are analyzed to verify the accuracy of the standards used to calibrate the instrument for wavelength and intensity An LCS must be analyzed with each analytical batch or once a day whichever is more frequent The LCS will be evaluated on two parameters and it must meet the acceptance criteria for both to be considered acceptable These parameters are (1) accurate asbestiform identification and (2) accurate fiber counting and sizing The acceptable %R for LCS criteria is between 80 and 120%R %R is calculated by the following

$$\%R = \frac{\text{Found}}{\text{True}} \times 100$$

Where Found = result of asbestos (percent weight) measured in the LCS

True = result of asbestos (percent weight) in the LCS source

Evaluation Verify LCS analysis was performed at the required frequency for wavelength and intensity

Action The validator should use professional judgment to determine if the associated sample results should be qualified

Evaluation Verify LCS result is between 80 and 120%R for wavelength and intensity

Action

Same Approach As CLV

%R	Detected Results Qualifier	Nondetected Results Qualifier
65 79%	J	UJ
121 135%	J	No qualifier
<65%	R	No qualifier
>135%	R	No qualifier

Section 4
Duplicate Sample Analysis
4 1 Laboratory Duplicate Samples

Laboratory duplicate samples are splits of a well-homogenized sample that is prepared by the laboratory personnel Because the laboratory is aware that the samples are duplicates, these samples serve to test the precision of the laboratory s sample preparation and analysis A laboratory duplicate should be performed at a frequency of 5 percent of all field samples prepared for analysis (one laboratory duplicate for every 20 field samples) or one per preparation batch whichever is more frequent The acceptable criteria for a laboratory duplicate is a relative percent difference (RPD) less than or equal to 35 percent when both results are >5 times the reporting limit, or the difference between the duplicate and the original is less than two times the reporting limit when either sample result is <5 times the reporting limit

Evaluation Verify laboratory duplicate sample analysis was performed at the required frequency

Action The validator should use professional judgment to determine if the associated sample results should be qualified

Evaluation Verify RPD ≤ 35 percent or difference is less than two times the reporting limit whichever is applicable

Action RPD > 35 percent or difference is greater than two times the reporting limit qualify all results as estimated (J)

4 2 Field Duplicate Samples

Field duplicate samples are co-located soil samples that are collected by the field personnel, but the laboratory is unaware that the samples are duplicates These samples serve to test the precision of both the field sampling and the laboratory s sample preparation and analysis A field duplicate should be collected at a frequency of 5 percent of all field samples prepared for analysis (one laboratory duplicate for every 20 field samples) or one per preparation batch whichever is more frequent The acceptable criteria for a field duplicate is an RPD less than or equal to 50 percent when both results are >5 times the reporting limit or the difference between the duplicate and the original is less than four times the reporting limit when either sample result is <5 times the reporting limit

Evaluation Verify field duplicate sample analysis was performed at the required frequency

Action The validator should use professional judgment to determine if the associated sample results should be qualified

Evaluation Verify RPD ≤ 50 percent, or difference is less than four times the reporting limit, whichever is applicable

Action RPD > 50 percent, or difference is greater than four times the reporting limit, qualify all results as estimated (J)

4 3 Preparation Duplicate Samples

Preparation duplicate samples are splits of samples submitted for sample preparation prior to laboratory analysis These samples serve to test the precision of both the sample preparation personnel and the laboratory s sample preparation and analysis A preparation duplicate sample should be submitted at a frequency of 5 percent of all field samples prepared for analysis (one preparation duplicate for every 20 field samples) or one per preparation batch whichever is more frequent The acceptable criteria for a field duplicate is an RPD less than or equal to 50 percent when both results are >5 times the reporting limit or the difference between the duplicate and the original is less than four times the reporting limit when either sample result is <5 times the reporting limit

Evaluation Verify preparation duplicate sample analysis was performed at the required frequency

Action The validator should use professional judgment to determine if the associated sample results should be qualified

Evaluation Verify RPD ≤ 50 percent or difference is less than four times the reporting limit whichever is applicable

Action RPD > 50 percent or difference is greater than four times the reporting limit qualify all results as estimated (J)

4 3 IR and SEM Sample Splits

Selected field samples will be analyzed by both infrared spectroscopy (IR) and scanning electron microscopy (SEM) methods The sample results will be compared to determine if the IR results and SEM results are within an acceptable RPD range The acceptable criteria for a laboratory duplicate is an RPD less than or equal to 35 percent when both results are >5 times the reporting limit or the difference between the duplicate and the original is less than two times the reporting limit when either sample result is <5 times the reporting limit

Evaluation Verify RPD ≤ 35 percent or difference is less than two times the reporting limit

Action RPD > 35 percent or difference is greater than two times the reporting limit qualify all results as estimated (J)

Section 5
Rinsate Samples

Rinsate samples are collected to determine if decontamination procedures utilized in the field are not adequate and result in cross-contamination of samples Rinsate samples will be collected at the end of each day during the first week of sampling Continuation of rinsate sample collection will depend on the results of the initial rinsate samples Multiplying the highest concentration of asbestos detected in the rinsate times five gives the action level for qualification based on contamination from sampling equipment

- **Evaluation** Verify rinsate sample analysis was performed at the required frequency
- **Action** Minimum frequency was not met, the validator should use professional judgment to determine if the associated sample results should be qualified
- **Evaluation** Calculate rinsate sample action level for qualification
- **Action** All associated detected results less than the action level are qualified as nondetect (U)

Site-Specific Standard Operating Procedure for Data Validation of Asbestos Results Obtained by Scanning Electron Microscopy for the Contaminant Screening Study of the Libby Asbestos Project

Project Libby Asbestos Remedial Investigation - Contaminant Screening Study (CSS)

Project Number 3282-116

Prepared by Dee Warren DAW 3/28/02
Environmental Specialist Date

Approved by _____ April 4, 2002
Project Manager Date

_____ April 4, 2002
Technical Reviewer Date

_____ 04/04/02
QA Reviewer Date

No U S Environmental Protection Agency (EPA) approved criteria currently exists for the validation of asbestos results The following procedures for data validation are based on the EPA Contract Laboratory Program (CLP) National Functional Guidelines for Inorganic Data Review (EPA 1994) and EPA Standard Operating Procedure (SOP) No EPA-LIBBY-01, Asbestos Analysis of Soils by Scanning Microscopy and Energy Dispersive X-Ray Spectroscopy (EPA 2000) These procedures will be used in the data validation and evaluation process for results gathered as part of the contaminant screening study (CSS) of the Libby Asbestos Project This is a working document and applicable changes will be made as the validation procedure is implemented

Section 1
Calibration Criteria
1 1 Initial Calibration

The scanning electron microscope (SEM) is calibrated with four standards at the following minimum frequency (1) prior to receipt of samples, (2) monthly after first calibration, and (3) after any maintenance Data packages will be checked to ensure that the following initial calibration standards are met and performed at the required frequency Initial calibration consists of magnification calibration, peak centroid calibration, resolution calibration, and sodium sensitivity If the laboratory has failed to provide adequate calibration information the designated representative should contact the laboratory and request the necessary information

Evaluation Verify initial calibration was performed at the proper frequency

Action Minimum frequency was not met, qualify the data as unusable (R)

1 1 1 Magnification Calibration

The magnification calibration should fall within ± 10 percent of the certified values as indicated in the calibration standard manufacturer s specifications The results of this calibration are recorded on the data collection logsheet

Evaluation Verify magnification calibration is within ± 10 percent of the certified values

Action

Certified Value	Detected Results Qualifier	Nondetected Results Qualifier
0 to +25%	J	No qualifier
0 to 25%	J	UJ
< 25%	R	No qualifier
> +25%	R	No qualifier

1 1 2 Peak Centroid Calibration

The aluminum centroid peak should be 1 487 (± 0 05) KeV and the copper centroid peak should be 8 047 (± 0 05) KeV The results of this calibration are recorded on the data collection logsheet

Evaluation Verify peak centroid calibration is within ± 0 05 KeV of the certified values

Action

Centroid Calibration	Detected Results Qualifier	Nondetected Results Qualifier
> ± 0 05 KeV but < ± 0 25 KeV	J	UJ
> ± 0 25 KeV	R	R

1 1 3 Resolution Calibration

The resolution must be no greater than 175 eV The results of this calibration are recorded on the data collection logsheet

Evaluation Verify resolution calibration is ≤ 175 eV

Action

Resolution	Detected Results Qualifier	Nondetected Results Qualifier
>175 eV but <200 eV	J	UJ
>200 eV	R	R

1 1 4 Sodium Sensitivity

The sodium sensitivity calibration should be performed in accordance with the manufacturer s specifications These specifications and the acceptable criteria should be included in each data package

Evaluation ???

Action ???

1 2 Continuing Calibration

An independent laboratory control sample (LCS) must be analyzed with each analytical batch or once a day, whichever is more frequent An analytical batch is comprised of 20 field samples The acceptable percent recovery (%R) for continuing calibration criteria is between 80 and 120%R %R is calculated by the following

$$\%R = \frac{\text{Found}}{\text{True}} \times 100$$

Where Found = result of asbestos (percent weight) measured in the LCS

True = result of asbestos (percent weight) in the LCS source

Evaluation Verify continuing calibration was performed at the required frequency

Action Minimum frequency was not met, qualify the data as unusable (R)

Evaluation Verify continuing calibration is between 80 and 120%R

Action

%R	Detected Results Qualifier	Nondetected Results Qualifier
65 79%	J	UJ
121 135%	J	No qualifier
<65%	R	No qualifier
>135%	R	No qualifier

Section 2
Method Blanks

An instrument blank is composed of the field sample matrix that is free of the analyte of interest (e g asbestos-free soil) Method blanks are put through the same sample preparation steps as field samples and are used to discern if laboratory-induced contamination is present Detection of a single asbestos fiber suggests that laboratory-induced contamination is present All associated samples may require re-preparation and re-analysis Method blanks must be analyzed with each analytical batch or once a day whichever is more frequent An analytical batch is comprised of 20 field samples Multiplying the highest concentration of asbestos detected in the method blank times five gives the action level for qualification based on method blank contamination

Same as EQ

Evaluation Verify method blank analysis was performed at the required frequency

Action Minimum frequency was not met, the validator should use professional judgment to determine if the associated sample results should be qualified

Evaluation Calculate the method blank action level for qualification

Action All detected results less than the action level are qualified as estimated (U)

Section 3
Laboratory Control Sample (LCS)

Laboratory control samples are certified reference standards (independent from the calibration standards) consisting of several asbestiforms Because LCSs are independent of the calibration standards, they are analyzed to verify the accuracy of the standards used to calibrate the instrument An LCS must be analyzed with each analytical batch or once a day whichever is more frequent The LCS will be evaluated

on two parameters and it must meet the acceptance criteria for both to be considered acceptable These parameters are (1) accurate asbestiform identification and (2) accurate fiber counting and sizing The acceptable percent recovery (%R) for continuing calibration criteria is between 80 and 120%R %R is calculated by the following

$$\%R = \frac{\text{Found}}{\text{True}} \times 100$$

Where Found = result of asbestos (percent weight) measured in the LCS

True = result of asbestos (percent weight) in the LCS source

Evaluation Verify LCS analysis was performed at the required frequency

Action The validator should use professional judgment to determine if the associated sample results should be qualified

Evaluation Verify LCS result is between 80 and 120%R

Action

%R	Detected Results Qualifier	Nondetected Results Qualifier
65 79%	J	UJ
121 135%	J	No qualifier
<65%	R	No qualifier
>135%	R	No qualifier

Section 4
Duplicate Sample Analysis
4 1 Laboratory Duplicate Samples

Laboratory duplicate samples are splits of a well-homogenized sample that is prepared by the laboratory personnel Because the laboratory is aware that the samples are duplicates, these samples serve to test the precision of the laboratory's sample preparation and analysis A laboratory duplicate should be performed at a frequency of 5 percent of all field samples prepared for analysis (one laboratory duplicate for every 20 field samples) or one per preparation batch, whichever is more

frequent The acceptable criteria for a laboratory duplicate is a relative percent difference (RPD) less than or equal to 35 percent when both results are >5 times the reporting limit, or the difference between the duplicate and the original is less than two times the reporting limit when either sample result is <5 times the reporting limit

Evaluation Verify laboratory duplicate sample analysis was performed at the required frequency

Action The validator should use professional judgment to determine if the associated sample results should be qualified

Evaluation Verify RPD ≤ 35 percent, or difference is less than two times the reporting limit whichever is applicable

Action RPD > 35 percent or difference is greater than two times the reporting limit qualify all results as estimated (J)

4 2 Field Duplicate Samples

Field duplicate samples are co-located soil samples that are collected by the field personnel, but the laboratory is unaware that the samples are duplicates These samples serve to test the precision of both the field sampling and the laboratory s sample preparation and analysis A field duplicate should be collected at a frequency of 5 percent of all field samples prepared for analysis (one laboratory duplicate for every 20 field samples) or one per preparation batch whichever is more frequent The acceptable criteria for a field duplicate is an RPD less than or equal to 50 percent when both results are >5 times the reporting limit or the difference between the duplicate and the original is less than four times the reporting limit when either sample result is <5 times the reporting limit

Evaluation Verify field duplicate sample analysis was performed at the required frequency

Action The validator should use professional judgment to determine if the associated sample results should be qualified

Evaluation Verify RPD ≤ 50 percent or difference is less than four times the reporting limit whichever is applicable

Action RPD > 50 percent or difference is greater than four times the reporting limit, qualify all results as estimated (J)

4 3 Preparation Duplicate Samples

Preparation duplicate samples are splits of samples submitted for sample preparation prior to laboratory analysis These samples serve to test the precision of both the sample preparation personnel and the laboratory s sample preparation and analysis

A preparation duplicate sample should be submitted at a frequency of 5 percent of all field samples prepared for analysis (one preparation duplicate for every 20 field samples) or one per preparation batch whichever is more frequent The acceptable criteria for a field duplicate is an RPD less than or equal to 50 percent when both results are >5 times the reporting limit or the difference between the duplicate and the original is less than four times the reporting limit when either sample result is <5 times the reporting limit

Evaluation Verify preparation duplicate sample analysis was performed at the required frequency

Action The validator should use professional judgment to determine if the associated sample results should be qualified

Evaluation Verify RPD ≤ 50 percent, or difference is less than four times the reporting limit, whichever is applicable

Action RPD > 50 percent or difference is greater than four times the reporting limit qualify all results as estimated (J)

4 4 IR and SEM Sample Splits

Selected field samples will be analyzed by both infrared spectroscopy (IR) and SEM methods The sample results will be compared to determine if the IR results and SEM results are within an acceptable RPD range The acceptable criteria for a laboratory duplicate is an RPD less than or equal to 35 percent when both results are >5 times the reporting limit, or the difference between the duplicate and the original is less than two times the reporting limit when either sample result is <5 times the reporting limit

Evaluation Verify RPD ≤ 35 percent, or difference is less than two times the reporting limit

Action RPD > 35 percent or difference is greater than two times the reporting limit qualify all results as estimated (J)

Section 5
Rinsate Samples

Rinsate samples are collected to determine if decontamination procedures utilized in the field are not adequate and result in cross-contamination of samples Rinsate samples will be collected at the end of each day during the first week of sampling Continuation of rinsate sample collection will depend on the results of the initial rinsate samples Multiplying the highest concentration of asbestos detected in the rinsate times five gives the action level for qualification based on contamination from sampling equipment

- **Evaluation** Verify rinsate sample analysis was performed at the required frequency
- **Action** Minimum frequency was not met the validator should use professional judgment to determine if the associated sample results should be qualified
- **Evaluation** Calculate rinsate sample action level for qualification
- **Action** All associated detected results less than the action level are qualified as nondetect (U)

Date January 7 2000 (Rev #1) SOP No ISSI-LIBBY-01

Title SOIL SAMPLE PREPARATION

APPROVALS

Author Adrian Bradley ISSI Consulting Group Inc Date December 22 1999

SYNOPSIS A standardized method for homogenization of surface soil samples is described. Protocols for sample preparation and handling are provided.

Received by QA Unit

REVIEWS

TEAM MEMBER	SIGNATURE/TITLE	DATE
EPA Region 8		1/7/00
ISSI Consulting Group Inc		1/7/00

Revision Date	Reason for Revision
1/7/99	Incorporation of sieving to the sample preparation.

1.0 PURPOSE

The purpose of this Standard Operating Procedure (SOP) is to provide a standardized method for homogenizing surface soil samples. This procedure will be used by employees of USEPA Region 8 and by contractors/subcontractors supporting USEPA Region 8 projects and tasks. This SOP describes the equipment and operations used for homogenizing surface soil samples in a manner that will produce data that can be used to support risk evaluations. Site specific deviations from the procedures outlined in this document must be approved by the USEPA Region 8 Remedial Project Manager, or Regional Toxicologist prior to initiation of the sampling activity.

2.0 RESPONSIBILITIES

The Field Project Leader (FPL) may be an USEPA employee or contractor who is responsible for overseeing the surface soil sampling activities. The FPL is also responsible for checking all work performed and verifying that the work satisfies the specific tasks outlined by this SOP and the Project Plan. It is the responsibility of the FPL to communicate with the Field Personnel regarding specific collection objectives and anticipated situations that require any deviation from the Project Plan. It is also the responsibility of the FPL to communicate the need for any deviations from the Project Plan with the appropriate USEPA Region 8 personnel (Remedial Project Manager, or Regional Toxicologist).

Field personnel performing surface soil sampling are responsible for adhering to the applicable tasks outlined in this procedure while homogenizing surface soil samples.

3.0 EQUIPMENT

- General purpose laboratory oven - must be capable of maintaining a constant temperature of approximately 103-105°C.
- Sample drying trays - capable of holding an even layer of the complete sample volume of each sample. To minimize the decontamination effort, disposable drying trays are recommended.
- Analytical balance - accurate to 0.1 g, range of 0.1 g to 1000 g.
- Riffle splitter - with 3/4 to 1 inch chutes to split samples.
- Stainless steel or teflon scoop or spoon - for transfering samples.
- Collection containers - plastic ziplock bags.

- Gloves - for personal protection and to prevent cross-contamination of samples May be plastic or latex Disposable, powderless
- Field clothing and Personal Protective Equipment - as specified in the Health and Safety Plan.
- Field notebook -used to record progress, any problems or observations
- Permanent marking pen - used to label sample containers
- Three-ring binder book - binders will contain Soil Preparation Sheets, Field Split Sample Log sheets, and sample labels
- Trash Bag - used to dispose of gloves and wipes

4 0 METHOD SUMMARY

Soil samples will be dried in a standard laboratory oven, then homogenized and split for subsequent analysis

5 0 BULK SOIL DRYING

Set the oven temperature to 103-105 °C (not to exceed 115 °C) Establish the drying time by weighing a representative sample before drying, at estimated completion, and following an additional 15 minute drying time to confirm stable weight. Verify that the sample is completely dry using the "squeeze test", squeezing a portion of the sample between a freshly gloved thumb and forefinger Sample dryness is indicated by a lack of cohesiveness in the soil

Prior to drying each sample, record the weight on the Sample Preparation Logbook Sheet. Spread the sample on the drying tray in an even layer to promote even drying Check the oven temperature to verify that proper temperature has been reached. Mark each tray with the sample ID number Place the drying trays containing the samples in the oven. Leave the samples in the oven until completely dry Verify that each sample is dry by testing cohesiveness using a freshly gloved thumb and forefinger Record the weight after drying on the Sample Preparation Logbook Sheet. Document the sample drying time for each sample on the Soil Preparation Data Sheet (Attachment 1)

When samples are dry, remove from the oven area and place in the ventilation area. **Before placing samples in the ventilation area, verify that the hood is turned on.** A new pair of gloves must be worn for each sample

The sample should be coarse sieved and the mesh size recorded. Pour the material which passed through the sieve into a new sample bag, and mark the outside of the bag with the sample ID

Gently knead contents of the bag to break up any remaining soil clumps. Complete seal the bag, then mix by turning the bag end over end slowly for a minimum of ten times.

6.0 SAMPLE SPLITTING

Following the procedures outlined in Section 5.0, the soil sample should be well-homogenized. With the hood turned on, open the sample bag and use a clean and dry riffle splitter to split each sample.

The following method for splitting a soil sample was adapted from EPA 540-R-97-028 (USEPA, 1997). The sample is split by placing soil onto a splitter tray. Shake the tray to evenly distribute the sample. Place the long lip of the tray against the long lip of the splitter hopper and slowly rotate the tray so that the sample slowly empties into the splitter and slides down the rear wall of the hopper to the chutes, collecting the sample in two receiving trays. Tap the sample tray vigorously several times to free any remaining material. Tap the splitter to facilitate the flow of all material through the chutes into the receiving trays. The corners and nooks of the splitter may be cleaned with a coarse nylon brush.

Pour the material from one of the receiving trays into a clean bucket and tap the tray vigorously to assure complete transfer. This portion is designated for archive. The original sample tray (which is now empty), and the emptied receiving tray should be placed under the splitter as the new receiving trays.

Repeat the process of dispersing the remaining sample material (containing half the mass of the original sample) by shaking the sample tray so that it is uniformly distributed. Repeat the procedure described above for splitting the sample. At the end of the second split, carefully transfer the material from each of the receiving trays into a clean, pre-weighed sample bag to weighed and packaged for shipment to the laboratory and to W.R. Grace. Record each split sample ID, and the original sample ID on the Field Split Sample Log sheet (Attachment 1).

7.0 FIELD DOCUMENTATION

Each sample ID must be recorded on the data sheets. Original sample ID numbers are recorded on the Soil Preparation Sheets, and the Field Split Sample Log sheets. When the original sample is split, the original sample ID number, and each new sample, must be recorded.

In addition, a field notebook should be maintained by each individual or team that is preparing samples. For each day that samples are processed, the following information should be collected.

- date
- time
- personnel

- weather conditions
- analytical balance calibration
- drying oven temperature
- descriptions of any deviations to the Project Plan and the reason for the deviation

Field personnel will prepare the proper type and quantity of quality control samples as prescribed in the Project Plan.

8.0 DECONTAMINATION

All non-dedicated equipment used during sample preparation must be decontaminated prior to use. It is recommended that disposable oven trays be used to minimize the decontamination effort. Stainless steel or teflon scoops or spoons, splitters, sieves and drying trays that will be re-used, must be decontaminated with de-ionized (DI) water and disposable wipes or towels. DI water is poured over the equipment, then wiped, then rinsed again with DI water. If soil particles are visible on any of the equipment, repeat this procedure until the equipment is clean. All equipment must be dry before it is re-used.

9.0 GLOSSARY

Project Plan - The written document that spells out the detailed site-specific procedures to be followed by the Project Leader and the Field Personnel.

11.0 REFERENCES

American Society for Testing and Materials. 1998. Standard Practice for Reducing Samples of Aggregate to Testing Size, ASTM Designation: C 702 - 98, 4 p.

USEAP. 1997. Superfund Method for the Determination of Releasable Asbestos in Soils and Bulk Materials. EPA 540-R-97-028.

ATTACHMENT 1

Sample Preparation Logbook Sheet

Sample ID	Prep Batch Number	Sample Drying							Notes
		Date/Time Drying Begun [a]	Date/Time Drying Completed [a]	Oven Temp (C)	Sample Mass [b] (grams)				
					Before	After 1	After 2	After 3	

[a] Enter date in the following format mm/dd/yy enter time as 24-hour time (e g 1340)

[b] At least 2 mass measurements will be recorded The sample is completely dry if the mass measurement is stable

Field Split Sample Logsheet

Date	Sample ID	Original Sample ID	Prepared By	Date Prepared	Notes

Completion of Field Sample Data Sheets

Project Libby Asbestos Remedial Investigation - Contaminant Screening Study (CSS)

Project No 3282-116

Project Manager [signature] Date April 4, 2002

Technical Reviewer [signature] Date April 4, 2002

A field sample data sheet (FSDS) must be completed using the following guidance

Definitions

Owner - person who owns a residential property (may or may not be the current occupant), or the person who owns a commercial property

Sample Coordinator - person responsible for the custody of all field paper work and samples collected

Field Sample Data Sheet for Soil

Sheet No Pre-assigned unique sequential sheet number Completed by sample coordinator

Scenario No Scenario numbers are specific to the Phase II sampling program and do not apply to the CSS "NA" should be placed in this blank

Field Logbook No The logbook number being used to record information specific to the samples on the FSDS

Page No Page number in logbook on which information regarding the samples on the FSDS is recorded

Sampling Date Date samples are collected, in the form MM/DD/YY

Address The address of the property being sampled Addresses are to be entered in the following format

Street number - Direction - Street Name - Street Abbreviation

Where
Street number = the number of the street address

Completion of Field Sample Data Sheets

Direction = the abbreviation of the street direction (N S E or W) when applicable
Street name = correct spelling of the street name
Street abbreviation = when applicable

Road - Rd
Avenue - Ave
Street - St
Circle - Cr
Place - Pl
Boulevard - Blvd
Highway - Hwy

Examples 510 N Mineral Ave
607 N Michigan Ave
521 Pipe Creek Rd

Owner Name of the property owner (not necessarily the current occupant)

Land Use Description of land use on which property is located

Sampling Team Company affiliation of sampling team

Names Full name of all members of the sampling team

Index ID Sample identification (ID) number Index ID numbers for the CSS are in the form CSS-##### A set of available numbers is assigned to each sampling team by the sample coordinator

Location ID Unique identification number assigned to each sample location with a unique global positioning system (GPS) coordinate For soil samples location identifications (IDs) are in the form SP-##### A set of available numbers is assigned to each sampling team by the sample coordinator

Sample Group The sample group for soil samples collected for the CSS must be one of the following options

Yard
Garden
Driveway
Road
Flower Bed
Field
Walkway
Park
School

Location Description Description of the location where a soil sample was collected If back yard front yard, or side yard do not apply use the other blank

Completion of Field Sample Data Sheets

Category FS = field sample and FD = field duplicate The field duplicate blank should be used to identify the FD of the parent FS

Matrix Type The samples collected for the CSS will mostly be surface samples (0 to 1 or 0 to 6 inches) If a sample that is collected is not a surface sample complete the other line using the following options mining waste, subsurface soil, fill

Type Indicate the type of sample collected grab or composite If the sample is a composite sample, the number of subsamples must be provided

Time The time of sample collection, in military time

Top Depth Top depth of sample in inches below the ground surface

Bottom Depth Bottom depth of sample in inches below the ground surface

Grid, Quadrant, Section Specific to the grid, quadrant, and section the sample is collected in Entry should follow the example below

45C3

Where

45 = Grid number
C = Quadrant letter
3 = Section number

05A1

Where

05 = Grid number
A = Quadrant letter
1 = Section number

Field Comments Any information specific to a sample If vermiculite is present this must be noted in the field comments section

Entered Completed at time of data entry

Validated Completed at time of validated data receipt

Completed by Initials of field team member that completes the FSDS

QC by Initials of field team member that completes QC check of FSDS

Completion of Field Sample Data Sheets

Field Sample Data Sheet for Water

Water samples collected for the CSS will be rinsate samples The field data sheet should be completed using the following guidelines

Sheet No Pre-assigned unique sequential sheet number Completed by sample coordinator

Scenario No Scenario numbers are specific to the Phase II sampling program and do not apply to the CSS NA should be placed in this blank

Field Logbook No The logbook number being used to record information specific to the samples on the FSDS

Page No Page number in logbook on which information regarding the samples on the FSDS is recorded

Sampling Date Date samples are collected in the form MM/DD/YY

Address Does not apply to rinsate samples Place NA in blank

Owner Does not apply to rinsate samples Place NA in blank

Land Use Does not apply to rinsate samples Place NA in blank

Sampling Team Company affiliation of sampling team

Names Full name of all members of the sampling team

Index ID Sample identification number A set of available numbers is assigned to each sampling team by the sample coordinator

Location ID Does not apply to rinsate samples Place NA in blank

Sample Group Does not apply to rinsate samples Place NA in blank

Location Description Does not apply to rinsate samples Place NA in blank

Category FS = field sample and FD = field duplicate All rinsate samples are field samples

Matrix Type Chose rinsate

Field Comments Any information specific to a sample

Sheet No CSS (W)- _____

CONTAMINANT SCREENING STUDY

FIELD SAMPLE DATA SHEET FOR WATER

Scenario No _____ Field Logbook No _____ Page No _____ Sampling Date _____

Address _____ Owner _____

Land Use Residential School Commercial Mining Roadway Other ( )

Sampling Team PES CDM Other _____ Names _____

Data Item	Sample 1	Sample 2	Sample 3
Index ID			
Location ID			
Sample Group			
Location Description			
Category (circle)	FS Trip Blank FD_____	FS Trip Blank FD_____	FS Trip Blank FD _____
Matrix Type (circle)	Surface Water Well Water Laboratory Water Rinsate Other _____	Surface Water Well Water Laboratory Water Sediment Other _____	Surface Water Well Water Laboratory Water Sediment Other _____
Field Comments			
	Entered ___ Validated ___	Entered ___ Validated ___	Entered ___ Validated ___

Field Team	Initial
Completed by	
QC by	

Completion of Property Information Field Form

Project Libby Asbestos Remedial Investigation - Contaminant Screening Study(CSS)

Project No 3282-116

Project Manager J. Morton Date April 4, 2002

Technical Reviewer [signature] Date 4/4/02

An information field form (IFF) is to be completed for each structure located on a property Two IFFs will be used (1) primary structure and property assessment information field form and (2) secondary structure information field form The IFFs are completed from both interviews with the occupant/owner and visual inspection of the structures and surrounding properties and are used to facilitate the information-gathering process (interview and visual inspection) of properties during the contaminant screening study (CSS)

Definitions

Primary structure - Refers to the main inhabitable structure on a property or the main commercial structure on a property

Secondary structure - Refers to structures other than the primary structure located on a property (i e , shed, barn, detached garage with an attic, etc) Attached garages are considered part of the primary structure

Occupant - Refers to the person currently living in a primary residential structure

Owner - Refers to the person who owns a residential property (may or may not be the current occupant) or person who owns a commercial property

Primary Structure and Property Assessment Information Field Form

Each entry on the IFF should be completed following the guidance procedure, and any notes on each item should be written in the notes column to the right of each data item

Completion of Property Information Field Form

Header Information

AD# Refers to the location identification (ID) number of the structure the IFF is being completed for The field team obtains a list of available numbers from the sample coordinator

Field Logbook No The number of the field logbook that is used to record information specific to the property being assessed on the IFF

Page No The page numbers in the logbook that contain information specific to the property being assessed on the IFF

Site Visit Date Date of site visit, in the form MM/DD/YY

Address The address of the property being assessed on the IFF Addresses are to be entered in the following format

Street number - Direction - Street Name - Street Abbreviation

Where
Street number = the number of the street address
Direction = the abbreviation of the street direction (N, S, E, or W), when applicable
Street name = correct spelling of the street name
Street abbreviation = when applicable

Road - Rd
Avenue - Ave
Street - St
Circle - Cr
Place - Pl
Boulevard - Blvd
Highway - Hwy

Examples 510 N Mineral Ave
1616 Rainy Creek Rd
521 Pipe Creek Rd

Occupant Name of current occupants of the primary structure In the case of a commercial property, the occupant information would not be completed

Occupant Phone number Phone number of occupant of the primary structure

Completion of Property Information Field Form

Owner Only needs to be completed if the owner of the structure or property is different than the current occupant (i e , renter) Required for commercial properties

Owner Phone number Phone number of the owner of the property For residential properties, only complete if the owner is different than the current occupant Required for commercial properties

Sampling Team Full name and company of each member of the team assessing the property (i e , members sampling and/or completing IFF)

House Attributes

Property Description Description of the property specific to the IFF being completed

Surrounding Land Use Description of the land use groups surrounding the property specific to the IFF being completed Indicate all that apply

Year of Construction Year structure was constructed If occupant and/or owner do not know what year the structure was complete, choose unknown

Square Footage Calculated from the field diagram or estimated from occupant/owner interview

Construction Material Material structure is constructed from If other than wood, masonry, or stone, choose other and provide a description

Number of Floors Above Ground Number of floors above ground specific to the structure that is assessed on the IFF If other than 1, 2, or 3, provide number of floors in blank The number of floors above ground should include the attic only if it is used as a living space

Number of Rooms Per Floor Above Ground Number of rooms per floor that is above ground Enter number of rooms per floor next to the floor number If more than three floors are present, provide the information on the blank

Basement If a basement is present, choose yes If a basement is not present, choose no Basement refers to a room below ground level that a person can enter and stand upright (i e , a crawl space is not a basement)

Completion of Property Information Field Form

Heating Source Method by which heat is produced in the structure If a method other than wood/coal, electric, or propane/gas is used as a heating source, choose other and provide a description

Heat Distribution Method by which heat is distributed throughout the structure Occupant and/or owner should be able to provide this information

Occupant Information

Number of Adults/Employees For residences, provide the number of adults that live at the residence, for a commercial property, provide the number of employees that work in the structure

Number of Children For residences, provide the number of children living there, for a commercial property, indicate the number of children as zero

Years at Location Number of years current occupant or business has occupied the structure

Was the residence/building remodeled? Provide yes or no as an answer If yes, provide years since remodeling and location of remodeling If occupant/owner is unsure, provide a note in the provided space

Has resident/business purchased any Libby vermiculite materials from W R Grace in the past? Based on occupant/owner interview Provide yes or no as an answer If occupant/owner is unsure, provide a note in the provided space

Has the property at this location been used for a for-profit enterprise of distributing, treating, storing, or disposing of Libby vermiculite? Based on occupant/owner interview Provide yes or no as an answer If occupant/owner is unsure, provide a note in the provided space

Has any present or former occupant worked at the W R Grace mine and/or any former processing plant? Based on occupant/owner interview Provide yes or no as an answer If occupant/owner is unsure, provide a note in the provided space

Has any present or former occupant been diagnosed with an asbestos-related disease? Based on occupant/owner interview Provide yes or no as an answer If occupant/owner is unsure, provide a note in the provided space

Completion of Property Information Field Form

Are there any known areas of exposed vermiculite? Base yes or no answer on occupant/owner interview and visual inspection of home If yes, provide location of exposed vermiculite

Indoor Assessment

Vermiculite Insulation Past or Present Visual inspection of attic is required to answer item If owner/occupant indicates past presence of vermiculite insulation, note in space provided and year of removal if available Past or present presence in walls, basements, and crawl spaces can be answered from the occupant/owner interview, but this must be noted in the area provided

Evidence of Physical Damage? Based on visual inspection of interior

Evidence of Water Damage? Based on visual inspection of interior

Evidence of vermiculite used in building materials? Based on occupant interview and/or visual inspection If owner is unsure or visual inspection is not comprehensive, provide this information in the notes area

Outdoor Assessment

Libby Amphibole Sources Present Based on visual inspection of the property If vermiculite piles, tremolite rocks, or other primary sources are observed, provide yes as the answer If primary sources appear absent but vermiculite is observed in garden soils or other disturbed areas, provide yes as the answer with notes in the area provided

Proximity to Other Properties with Potential Sources of Libby Amphiboles Based on observations of nearby properties If near properties are known to contain potential sources of Libby amphiboles, it should be noted in this data item

Type and Frequency of Activity Near Vermiculite Material - Indoor Based on occupant/owner interview Frequency of contact, duration of contact, and extent of contact are required If no indoor vermiculite present, provide this information in the notes area

Type and Frequency of Activity Near Vermiculite Material - Outdoor Based on occupant/owner interview Frequency of contact, duration of contact, and

Completion of Property Information Field Form

extent of contact are required If no outdoor vermiculite present provide this information in the notes area

Additional Information

Any information concerning the presence of sources that are identified in the occupant/owner interview

Field Diagram of Property

To include location of all structures, observed sources, and location of all disturbed areas

Field Diagram of Primary Structure

To be completed for homes with vermiculite insulation past or present
Complete one sheet per floor and provide scale drawing of rooms

Secondary Structure Information Field Form

All data items are discussed above Not all items on the primary structure form are required on the secondary structure form

Heating Source and Heating Distribution may not be applicable to a secondary structure

AD#_____

LIBBY MONTANA SITE INVESTIGATION
Contaminant Screening Study
Primary Structure and Property Assessment Information Field Form

Field Logbook No _____ Page No _____ Site Visit Date _____

Address _____

Occupant _____ Phone Number _____

Owner (if different than occupant) _____ Phone Number _____

Sampling Team _____

Data Item	Value	Notes
HOUSE ATTRIBUTES		
Property Description	Residential Industrial Commercial	
Surrounding Land Use	Residential Industrial Commercial School Mining Other _____	
Year of Construction	_____ Unknown	
Square Footage		
Construction Material	Wood frame Masonry/Stone Other _____	
Number of Floors Above Ground	1 2 3 Other _____	
Number of Rooms Per Floor Above Ground	1 _____ 2 _____ 3 _____ Other _____	
Basement	Yes No	
Heating Source	Wood/Coal Electric Propane/Gas Other _____	
Heat Distribution	Forced air Radiant Other _____	

CSS INFORMATION FIELD FORM (continued)

Address _____ AD#_____

Data Item	Value	Notes
OCCUPANT INFORMATION		
Number of Adults/Employees	1 2 3 4 5 15 16 20 21 30 >30	
Number of Children	0 1 2 3 4 Other _____	
Years at Location	<1 1 5 5 10 10 15 >15	
Was the residence/building remodeled?	Yes No If yes When (years) <2 2 5 >5 Where Attic Living Areas Garage Basement Other _____	
Has resident/business purchased any Libby vermiculite materials from W R Grace in the past?	Yes No	
Has the property at this location been used for a for profit enterprise of distributing treating storing or disposing of Libby vermiculite?	Yes No	
Has any present or former occupant worked at the W R Grace mine and/or any former processing plant?	Yes No	
Has any present or former occupant been diagnosed with an asbestos related disease?	Yes No	
Are there any known areas of exposed vermiculite?	Yes No If yes Where Ceiling Walls Floors Attic Other _____	

CSS INFORMATION FIELD FORM (continued)

Address _____ AD#_____

Data Item	Value	Notes
INDOOR ASSESSMENT		
Vermiculite Insulation Past or Present	Attic Yes No NA Walls Yes No NA Basement Yes No NA Crawl Space Yes No NA Other _____	Visual confirmation of current presence or absence required for attic
Evidence of Physical Damage?	Yes No	
Evidence of Water Damage?	Yes No	
Evidence of vermiculite used in building materials?	Yes No	
OUTDOOR ASSESSMENT		
Libby Amphibole Sources Present	Garden Yes No NA Yard Yes No NA Stockpiles Yes No NA Other _____	
Proximity to Other Properties with Potential Sources of Libby Amphiboles	Next door Within sample block Other _____	
EXPOSURE ASSESSMENT		
Type and Frequency of Activity Near Vermiculite Material Indoor	Frequency: Once a day / Once a week / Once a month / Once a year Duration of Contact: <1 hour / 1 2 hours / 2 4 hours / >4 hours	

CSS INFORMATION FIELD FORM (continued)

Address _____ AD#_____

Data Item	Value		Notes
	Extent of Contact	Heavy Moderate Light	
Type and Frequency of Activity Near Vermiculite Material Outdoor	Frequency	Once a day Once a week Once a month Once a year	
	Duration of Contact	<1 hour 1 2 hours 2 4 hours >4 hours	
	Extent of Contact	Heavy Moderate Light	

ADDITIONAL INFORMATION

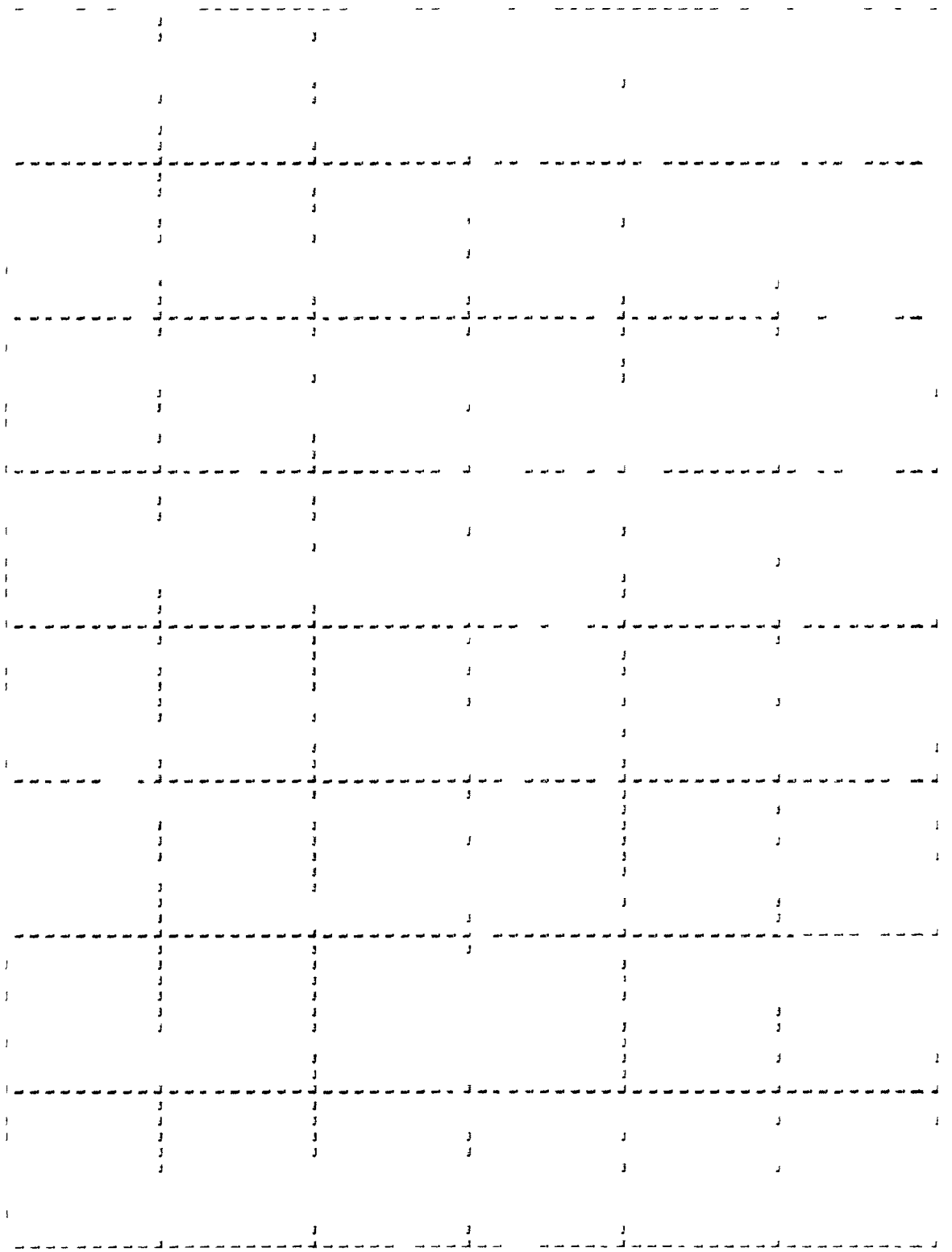
CSS INFORMATION FIELD FORM (continued)

Address _____ AD#_____

FIELD DIAGRAM OF PROPERTY

Identify important features (i e drainage trees gardens suspected Libby amphibole source areas etc)

NOT TO SCALE



CSS INFORMATION FIELD FORM (continued)

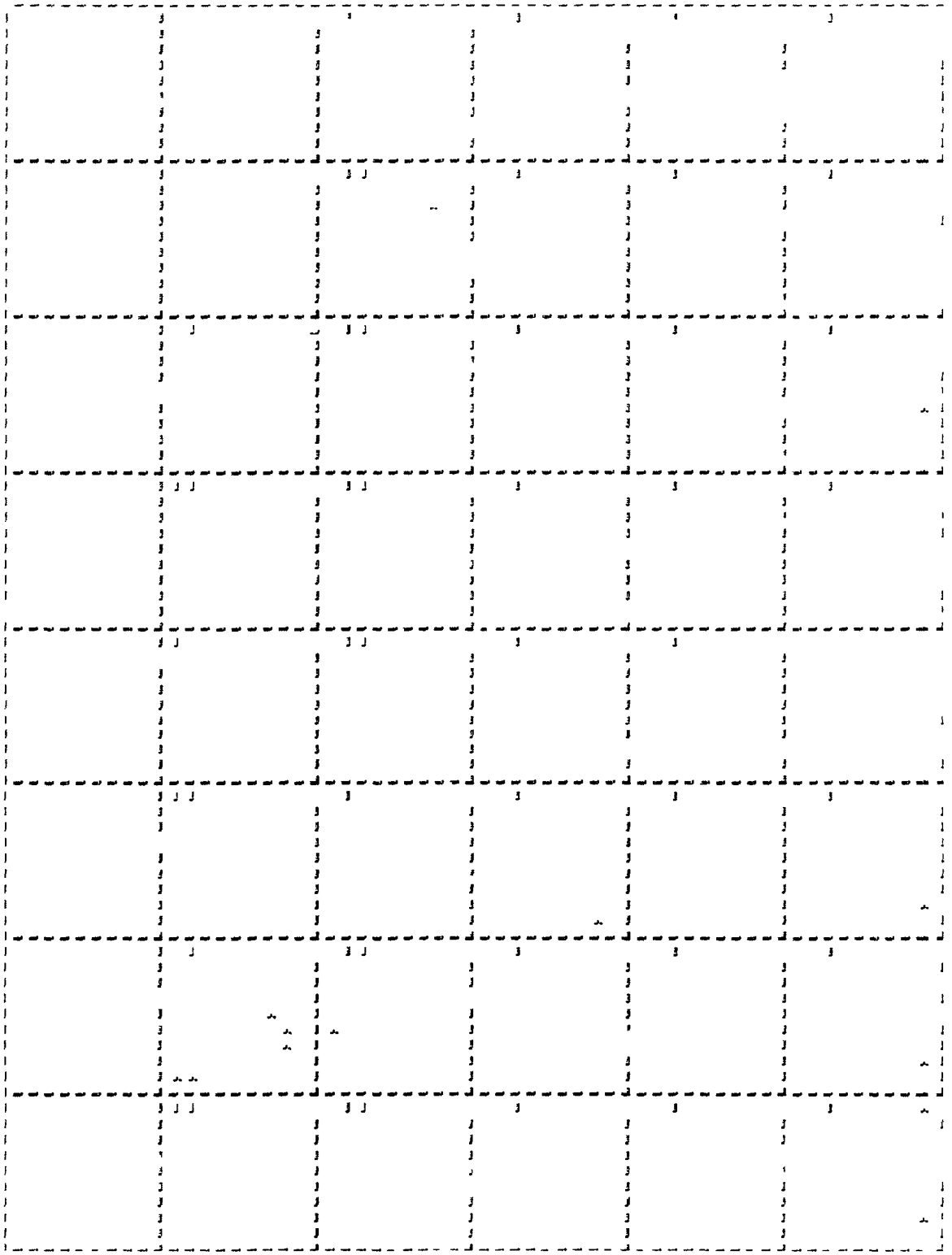
Address _____ AD#_____

FIELD DIAGRAM OF PRIMARY STRUCTURE

Floor of House (circle) First Second Third Basement

Include approximate dimensions of rooms and floor covering type Use more than one diagram if needed

Scale 1/10 = 1 foot



AD#_____

LIBBY MONTANA SITE INVESTIGATION
Contaminant Screening Study
Secondary Structure Information Field Form

Field Logbook No _____ Page No _____ Site Visit Date _____

Address _____

Occupant _____ Phone Number _____

Owner (if different than occupant) _____ Phone Number _____

Sampling Team _____

Data Item	Value	Notes
HOUSE ATTRIBUTES		
Property Description	Residential Industrial Commercial	
Surrounding Land Use	Residential Industrial Commercial School Mining Other _____	
Year of Construction	_____ Unknown	
Square Footage		
Construction Material	Wood frame Masonry/Stone Other _____	
Number of Floors Above Ground	1 2 3 Other _____	
Number of Rooms Per Floor Above Ground	1 _____ 2 _____ 3 _____ Other _____	
Basement	Yes No	
Heating Source	Wood/Coal Electric Propane/Gas NA Other _____	
Heat Distribution	Forced air Radiant NA Other _____	
Was the building remodeled?	Yes No	
Are there any known areas of exposed vermiculite?	Yes No If yes Where Ceiling Walls Floors Attic Other _____	

CSS INFORMATION FIELD FORM (continued)

Address _____ AD#_____

Data Item	Value	Notes
INDOOR ASSESSMENT		
Vermiculite Insulation Past or Present	Attic Yes No NA Walls Yes No NA Basement Yes No NA Crawl Space Yes No NA Other _____	Visual confirmation of current presence or absence required for attic
Evidence of Physical Damage?	Yes No	
Evidence of Water Damage?	Yes No	
Evidence of vermiculite used in building materials?	Yes No	
EXPOSURE ASSESSMENT		
Type and Frequency of Activity Near Vermiculite Material	Frequency: Once a day; Once a week; Once a month; Once a year Duration of Contact: <1 hour; 1 2 hours; 2 4 hours; >4 hours Extent of Contact: Heavy; Moderate; Light	

ADDITIONAL INFORMATION

_____

_____

_____

_____

_____

_____

CSS INFORMATION FIELD FORM (continued)

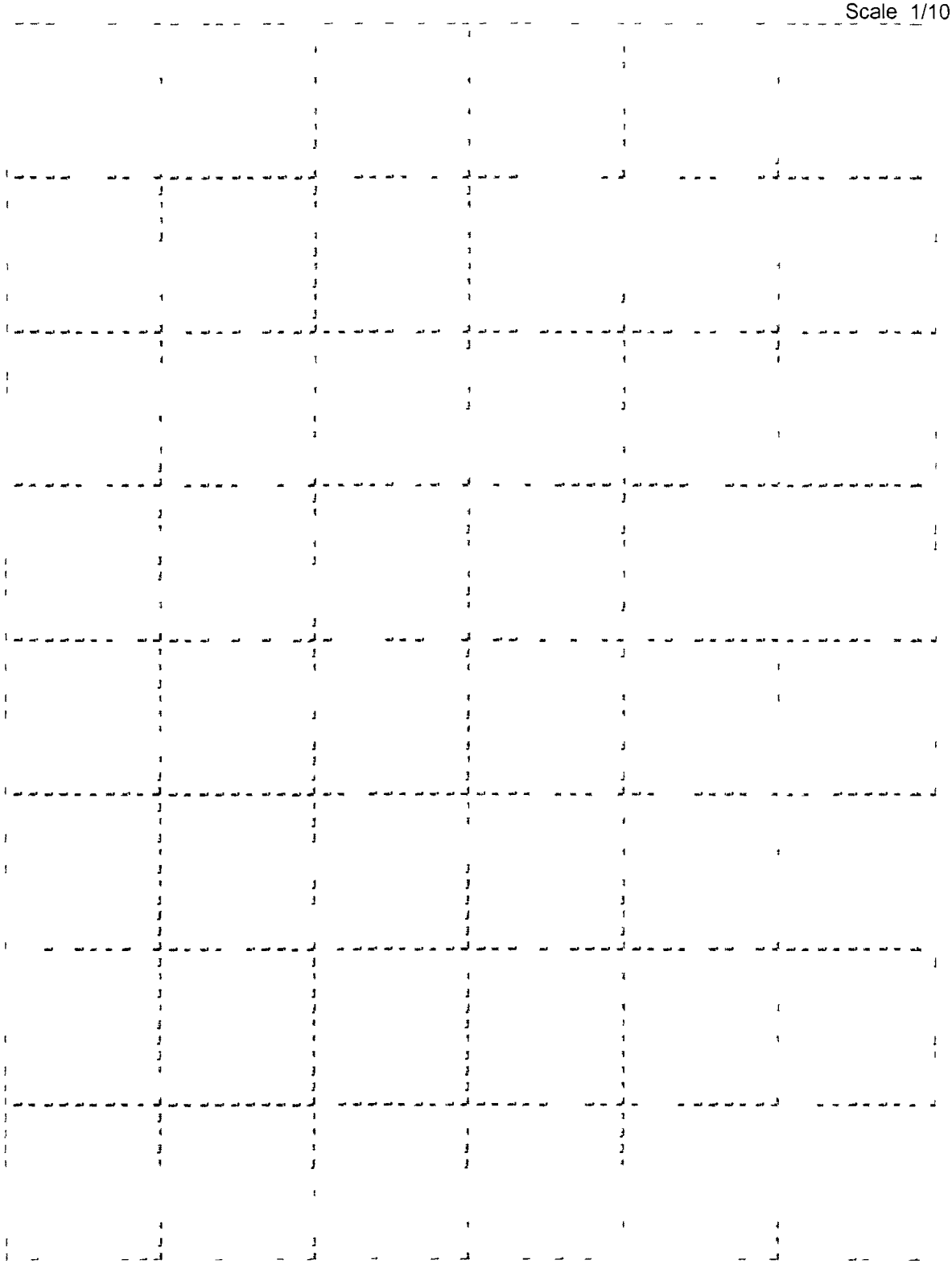
Address _____ AD#_____

FIELD DIAGRAM OF SECONDARY STRUCTURE

Floor of House (circle) First Second Third Basement

Include approximate dimensions of rooms and floor covering type Use more than one diagram if needed

Scale 1/10 = 1 foot



Completion of Field Sample Data Sheets

Entered Completed at time of data entry

Validated Completed at time of validated data receipt

Completed by Initials of field team member that completes the FSDS

QC by Initials of field team member that completes QC check of FSDS

- Visually observe vermiculite
- Segregate land uses
-

Sheet No CSS (S) - _____

CONTAMINANT SCREENING STUDY

FIELD SAMPLE DATA SHEET FOR SOIL

Scenario No _____ Field Logbook No _____ Page No _____ Sampling Date _____

Address _____ Owner _____

Land Use (circle) Residential School Commercial Mining Roadway Other ( )

Sampling Team (circle) CDM PES Other _____ Names _____

Data Item	Sample 1	Sample 2	Sample 3
Index ID			
Location ID			
Sample Group			
Location Description (circle)	Back yard Front yard Side yard Other _____	Back yard Front yard Side yard Other _____	Back yard Front yard Side yard Other _____
Category (circle)	FS FD_____	FS FD_____	FS FD _____
Matrix Type (Surface soil unless otherwise noted)	Surface Soil Other _____	Surface Soil Other _____	Surface Soil Other _____
Type (circle)	Grab Comp # subsamples _____	Grab Comp # subsamples _____	Grab Comp # subsamples _____
Sample Time			
Top Depth (in)			
Bottom Depth (in)			
Grid Quadrant Section			
Field Comments			
	Entered ___ Validated ___	Entered ___ Validated ___	Entered ___ Validated ___

Field Team	Initial
Completed by	
QC by	

Appendix B

Site Health and Safety Plan

This page intentionally left blank

Health and Safety Plan Form	Environmental Protection Agency -- Region 8 --	CDM Federal Programs Corporation
		Project Document No.: 3282-116-PP-HASP

Project Name	Libby Asbestos Superfund Site OU4	**Work Assignment No.**	116-RIRI-08BC **Region** 8
Job Site Address	All properties within Libby Valley (Fig. 3-1), encompassing approx. 88 sq. miles including the City of Libby and areas where Libby amphibole asbestos contamination has historically been found. This sampling effort is designed to investigate all properties within the Libby Valley and will include a verbal and visual investigation. CDM project office: 404 Highway 2 West, Libby, Montana 59923	**Client**	U. S. Environmental Protection Agency
		Project	Libby Asbestos RI OU4 - Contaminant Screening Study
Site Contact	Dave Schroeder	**EPA Client Contact**	Jim Christiansen, EPA RPM
Phone No.	406-293-8595 or 406-293-3568	**Phone No.**	303-312-6748

☐ **Amendment No. ___ to Existing Approved HSP - Date Existing Approved HSP** _____

Objectives of Field Work:

The purpose of this sampling effort is to determine the presence or absence of Libby amphibole asbestos contamination. Data obtained for this investigation will include verbal interviews, visual inspections, and onsite soil sampling. Results of this investigation will be used to facilitate any immediate removal actions deemed necessary by the EPA and for future project management decisions.

Type: Check as many as applicable

☐ Active	☐ Landfill	☐ Unknown
■ Inactive	■ Uncontrolled	☐ Military
■ Secure	■ Industrial	■ Other **specify**: Since this CSS will occur on all properties in the Libby Valley, facility types will vary greatly.
■ Unsecure	☐ Recovery	
☐ Enclosed space	☐ Well Field	

Description and Features: Summarize below. Include principal operations and unusual features (containers, buildings, dikes, power lines, hills, slopes, river)

The Town of Libby is located in the extreme northwest corner of Montana. According to historical mining records, 80 percent of the world's vermiculite came from the Zonolite Mountains in Libby, Montana. EPA has determined that the vermiculate ore that was mined from these mountains is contaminated with Libby amphibole asbestos. This ore was shipped throughout the United States both as processed and unprocessed material. EPA has been conducting various investigations to determine potentially contaminated properties, within Libby, which may have resulted from the Libby mining operations. This amphibole asbestos is suspected of affecting the health of the residents at various sites from numerous locations. The properties associated with this investigation may be contaminated with Libby amphibole asbestos from introduced sources. Properties include residential and small commercial areas and vary in size. Potential source materials include attic insulation and contaminated soils.

Surrounding Population: ■ Residential ■ Industrial ■ Rural ■ Urban ☐ Other:

This Page Reserved for Map (Show Exclusion, Contamination Reduction, and Support Zones. Indicate evacuation and reassembly points.)

See Figure 3-1 and Plate 1 in SAP text.

Health and Safety Plan Form	Environmental Protection Agency -- Region 8 --	CDM Federal Programs Corporation

History: Summarize below. In addition to history, include complaints from public, previous agency actions, known exposures or injuries, etc.

The Zonolite Mine began operation in 1924 by owner Edward Alley. In 1925, Great Northern Railroad shipped the first boxcar of "Zonolite" from Libby to an Ohio company that used it to insulate bank vaults, office safes, and filing cabinets. Other firms used the material to make building boards and roofing materials. Processing the material was a straightforward process. The vermiculite ore was stripped from the mine and hauled in trucks to a mill, where it was separated into various commercial sizes through a screening system. Some of the ore was shipped unprocessed. Other material was sent to an expansion plant where it was processed in ovens at about 2,000 degrees, causing it to expand to 15 times its original size. In 1939, Zonolite merged with another company mining at the bottom of the hill that eventually became known as the Zonolite Co. In 1963, the company was sold to W.R. Grace and Co. who expanded the operation and increased production. Through the 60s, 70s, and 80s, millions of tons of vermiculite ore was hauled by rail to Grace plants and other companies in 30 states and 6 foreign countries. At one time, 80 percent of the world's vermiculite came from Libby. The W.R. Grace Company, which owned the mine for 30 years, closed it in 1990 and sold the property 4 years later.

Waste Types: ☐ Liquid ■ Solid ☐ Sludge ☐ Gas ☐ Unknown ☐ Other **Specify**:

Waste Characteristics: Check as many as applicable.

☐ Corrosive
■ Toxic
☐ Inert Gas
☐ Flammable
☐ Volatile
☐ Unknown
☐ Radioactive*
☐ Reactive
■ Other **specify**: Carcinogenic

Work Zones: Describe the Exclusion, Contamination Reduction, and Support Zones in terms onsite personnel will recognize.

Work zones will be used during soil sampling. The exclusion zone will be areas in close proximity to soil sampling areas. The contamination reduction zone will be demarcated by the decontamination station set up at each sampling site. The support zone will be considered the 10-foot perimeter around support vehicles.

Hazards of Concern:

■ Heat Stress attach guidelines
■ Cold Stress attach guidelines
☐ Explosive/Flammable
☐ Oxygen Deficient
☐ Radiological
■ Biological: stinging insects, venomous reptiles
■ Other **Specify**: Inhalation of particulate matter
☐ Noise:
☐ Inorganic Chemicals
☐ Organic Chemicals
■ Motorized Traffic
☐ Heavy Machinery:
■ Slips, Trips, and Falls

Principle Disposal Methods and Practices: **Summarize below:**

The unused or below-grade material was disposed of by throwing it in piles around the facility. According to the previous site visit, there were no visible stockpiles of product that still exists.

Hazardous Material Summary: Circle waste type and estimate amounts by category

Chemicals Amounts/Units:	*Solids Amounts/Units:*	*Sludges Amounts/Units:*	*Solvents Amounts/Units:*	*Oils Amounts/Units:*	*Other Amounts/Units:*
☐ Acids	☐ Flyash	☐ Paint	☐ Halogenated (chloro, bromo)	☐ Oily Wastes	☐ Laboratory
☐ Pickling Liquors	■ Asbestos	☐ Pigments	☐ Solvents	☐ Gasoline	☐ Pharmaceutical
☐ Caustics	☐ Milling/Mine Tailings	☐ Metal Sludges	☐ Hydrocarbons	☐ Diesel Oil	☐ Hospital
☐ Pesticides	☐ Ferrous Smelter	☐ POTW Sludge	☐ Alcohols	☐ Lubricants	☐ Radiological
☐ Dyes/Inks	☐ Non-ferrous Smelter	☐ Aluminum	☐ Ketones	☐ PCBS	☐ Municipal
☐ Cyanides	☐ Metals:	☐ Distillation Bottoms	☐ Esters	☐ Polynuclear Aromatics	☐ Construction
☐ Phenols			☐ Ethers		☐ Munitions
☐ Halogens	☐ Other	☐ Other	☐ Other	☐ Other	☐ Other
☐ Dioxins	**Specify:**	**Specify:**	**Specify:**	**Specify:**	**Specify:**
☐ Other					
Specify:					

Overall Hazard Evaluation: ☐ High ☐ Medium ■ Low ☐ Unknown (Where tasks have different hazards, evaluate each. Attach additional sheets if necessary)

Justification: CDM personnel will avoid unnecessarily agitating suspect materials and visibly dusty conditions.

Fire/explosion Potential: ☐ High ☐ Medium ■ Low ☐ Unknown

Background Review: ■ Complete ☐ Incomplete Additional information to be collected in this and future investigations.

7GHSLIB.OU4

Known Contaminants	*Highest Observed Concentration (specify units and media)*	*PEL/TLV ppm or mg/m³ (specify)*	*IDLH ppm or mg/m³ (specify)*	*Excursion Limit (≤30 minutes)*	*Symptoms/Effects of Acute Exposure*	*Photoionization Potential*
Asbestos	2 percent (S)	0.1 f/cc (A)	N/A	NA	Assumed to be similar to overexposure of nuisance dust (e.g., eye irritant)	N/A

ACGIH = American Conference of Government Industrial Hygienists
CA = Human carcinogen
CAS = Chemical Abstract Service
IDLH = Immediately Dangerous to Life and Health (NIOSH standard enforced by law)
LEL = Lower Explosive Limit
mg/m^3 = milligrams per cubic meter
NE = Not established
NIOSH = National Institute for Occupational Safety and Health
OSHA = Occupational Safety and Health Administration
PEL = Permissible Exposure Limit (OSHA-established workplace standards enforced by law)
ppm = parts per million
STEL = Short Term Exposure Limit (15 minute TWA)
TLV = Threshold Limit Values (Recommended by ACGIH)
TWA = Time-Weighted Average (Average concentration for a normal 8-hour working day or 40-hour working week)
µg/kg = micrograms per kilogram
µg/ = micrograms per Liter

* = personal air monitoring
** = ambient/perimeter re-occupancy
*** = cutting hole in ceiling - 30 minute excursion

Health and Safety Plan Form	Environmental Protection Agency -- Region 8 --	CDM Federal Programs Corporation

Field Activities Covered under this Plan				*Hazard*
Task Description/specific Technique-Standard Operating Procedures/Site Location(attach additional sheets as necessary)	***Type***	***Primary***	***Contingency***	***Schedule***
1 Verbal interview/house sketch	Intrusive	Level D- Modified	Level C - Modified	Hazard Risk: LOW
	Non-Intrusive			Date: 2002
2 Visual Confirmation of potential Zonolite insulation in attic	Intrusive	Level C - Modified	Exit Area	Hazard Risk: LOW
	Non-Intrusive			Date: 2002
3 Soil Sampling	Intrusive	Level D- Modified	Level C - Modified	Hazard Risk: LOW
	Non-Intrusive			Date: 2002
4	Intrusive			Hazard Risk:
	Non-Intrusive			Date:
5	Intrusive			Hazard Risk:
	Non-Intrusive			Date:
6	Intrusive			Hazard Risk:
	Non-Intrusive			Date:
7	Intrusive			Hazard Risk:
	Non-Intrusive			Date:

Personnel and Responsibilities (Include subcontractors)

Name	Firm/Region	CDM Federal Health Clearance	Responsibilities	Onsite Involvement
Jeff Montera	CDM - Denver	Yes	Project Manager	No
Dave Schroeder	CDM - Fairfax	Yes	Onsite Manager	Task 1 -3
Anni Autio	CDM - Cambridge	Yes	Task Manager	No

Health and Safety Plan Form	Environmental Protection Agency -- Region 8 --	CDM Federal Programs Corporation

Protective Equipment: Specify by task. Indicate type and/or material as necessary. Use copies of this sheet if needed.

Block A — **Tasks: 1** — **Level: D - Modified** — ■ **Primary** ☐ **Contingency**

Respiratory: ■ Not Needed
☐ SCBA, Airline:
☐ APR: Full or half face
☐ Cartridge: P100
☐ Escape Mask:
☐ Other:

Head and Eye: ☐ Not Needed
■ Safety Glasses:
☐ Face Shield:
☐ Goggles:
☐ Hard Hat: For drilling and CPT/DPT activities
☐ Other:

Boots: ☐ Not Needed
■ Boots: **Leather steel-toed safety boots/shoes**
☐ Overboots:
☐ Rubber:

Prot. Clothing: ■ Not Needed
☐ Encapsulated Suit:
☐ Splash Suit:
☐ Apron
☐ Tyvek Coverall: if needed
☐ Cloth Coverall: Cotton as needed
☐ Other: Long pants & long-sleeved shirt

Gloves: ■ Not Needed
☐ Undergloves:
☐ Gloves: Nitrile or surgical/latex.
☐ Overgloves:

☐ Other - specify below:

Block B — **Tasks: 1** — **Level: C - Modified** — ☐ **Primary** ■ **Contingency**

Respiratory: ☐ Not Needed
☐ SCBA, Airline:
■ APR: Full or half face
■ Cartridge: P100
☐ Escape Mask:
☐ Other:

Head and Eye: ☐ Not Needed
■ Safety Glasses:
☐ Face Shield:
☐ Goggles:
☐ Hard Hat:
☐ Other:

Boots: ☐ Not Needed
■ Boots: **Leather steel-toed safety boots**
■ Overboots:
☐ Rubber:

Prot. Clothing: ☐ Not Needed
☐ Encapsulated Suit:
☐ Splash Suit:
☐ Apron
■ Tyvek Coverall:
☐ Cloth Coverall: Cotton as needed
☐ Other: Long pants & long-sleeved shirt

Gloves: ☐ Not Needed
☐ Undergloves:
■ Gloves: nitrile or surgical/latex
☐ Overgloves:

☐ Other - specify below:

Block C — **Tasks: 2** — **Level: C - Modified** — ■ **Primary** ☐ **Contingency**

Respiratory: ☐ Not Needed
☐ SCBA, Airline:
■ APR: Full or half face
■ Cartridge: P100
☐ Escape Mask:
☐ Other:

Head and Eye: ☐ Not Needed
■ Safety Glasses:
☐ Face Shield:
☐ Goggles:
☐ Hard Hat:
☐ Other:

Boots: ☐ Not Needed
■ Boots: **Leather steel-toed safety boots**
■ Overboots:
☐ Rubber:

Prot. Clothing: ☐ Not Needed
☐ Encapsulated Suit:
☐ Splash Suit:
☐ Apron
■ Tyvek Coverall:
☐ Cloth Coverall:
☐ Other:

Gloves: ☐ Not Needed
☐ Undergloves:
■ Gloves: Nitrile or surgical/latex.
☐ Overgloves:

☐ Other - specify below:

Block D — **Tasks: 2** — **Level: Exit Area** — ☐ **Primary** ■ **Contingency**

Respiratory: ☐ Not Needed
☐ SCBA, Airline:
☐ APR:
☐ Cartridge:
☐ Escape Mask:
☐ Other:

Head and Eye: ☐ Not Needed
☐ Safety Glasses:
☐ Face Shield:
☐ Goggles:
☐ Hard Hat:
☐ Other:

Boots: ☐ Not Needed
☐ Boots: Leather steel-toed work boots
☐ Overboots:
☐ Rubber:

Prot. Clothing: ☐ Not Needed
☐ Encapsulated Suit:
☐ Splash Suit:
☐ Apron
☐ Tyvek Coverall:
☐ Cloth Coverall:
☐ Other:

Gloves: ☐ Not Needed
☐ Undergloves:
☐ Gloves:
☐ Overgloves:

■ Other - specify below:
Exit area and consult H&S manager regarding PPE upgrade

Health and Safety Plan Form	Environmental Protection Agency -- Region 8 --	CDM Federal Programs Corporation

Protective Equipment: Specify by task. Indicate type and/or material as necessary. Use copies of this sheet if needed.

Block A — **Tasks: 3** — **Level: D - Modified** — ■ **Primary** ☐ **Contingency**

Respiratory: ■ Not Needed
☐ SCBA, Airline:
☐APR:
☐Cartridge: P100
☐ Escape Mask:
☐ Other:

Head and Eye: ☐ Not Needed
■ Safety Glasses:
☐ Face Shield:
☐ Goggles:
☐ Hard Hat:
☐ Other:

Boots: ☐ Not Needed
■ Boots: **Leather steel-toed safety boots**
☐ Overboots:
☐ Rubber:

Prot. Clothing: ■ Not Needed
☐ Encapsulated Suit:
☐ Splash Suit:
☐ Apron
☐ Tyvek Coverall: if needed
☐ Cloth Coverall: Cotton as needed
☐ Other: Long pants & long-sleeved shirt

Gloves: ■ Not Needed
☐ Undergloves:
☐ Gloves: Nitrile or surgical/latex.
☐ Overgloves:

☐ Other - specify below:

Block B — **Tasks: 3** — **Level: C- Modified** — ☐ **Primary** ■ **Contingency**

Respiratory: ☐ Not Needed
☐ SCBA, Airline:
■ APR:
■ Cartridge: P100
☐ Escape Mask:
☐ Other:

Head and Eye: ☐ Not Needed
■ Safety Glasses:
☐ Face Shield:
☐ Goggles:
☐ Hard Hat:
☐ Other:

Boots: ☐ Not Needed
■ Boots: **Leather steel-toed safety boots**
■ Overboots:
☐ Rubber:

Prot. Clothing: ☐ Not Needed
☐ Encapsulated Suit:
☐ Splash Suit:
☐ Apron
■ Tyvek Coverall:
☐ Cloth Coverall: Cotton as needed
☐ Other: Long pants & long-sleeved shirt

Gloves: ☐ Not Needed
☐ Undergloves:
■ Gloves: nitrile or surgical/latex
☐ Overgloves:

■ Other - specify below:

Block C — **Tasks:** — **Level:** — ☐ **Primary** ☐ **Contingency**

Respiratory: ☐ Not Needed
☐ SCBA, Airline:
☐ APR:
☐ Cartridge:
☐ Escape Mask:
☐ Other: PAPA

Head and Eye: ☐ Not Needed
☐ Safety Glasses:
☐ Face Shield:
☐ Goggles:
☐Hard Hat:
☐ Other:

Boots: ☐ Not Needed
☐ Boots: **Leather steel-toed safety boots**
☐ Overboots:
☐ Rubber:

Prot. Clothing: ☐ Not Needed
☐ Encapsulated Suit:
☐ Splash Suit:
☐ Apron
☐ Tyvek Coverall:
☐ Cloth Coverall:
☐ Other:

Gloves: ☐ Not Needed
☐ Undergloves:
☐ Gloves: Leather
☐ Overgloves:

☐ Other - specify below:

Block D — **Tasks:** — **Level:** — ☐ **Primary** ☐ **Contingency**

Respiratory: ☐ Not Needed
☐ SCBA, Airline:
☐ APR:
☐ Cartridge:
☐ Escape Mask:
☐ Other:

Head and Eye: ☐ Not Needed
☐ Safety Glasses:
☐ Face Shield:
☐ Goggles:
☐ Hard Hat:
☐ Other:

Boots: ☐ Not Needed
☐ Boots: Leather steel-toed work boots
☐ Overboots:
☐ Rubber:

Prot. Clothing: ☐ Not Needed
☐ Encapsulated Suit:
☐ Splash Suit:
☐ Apron
☐ Tyvek Coverall:
☐ Cloth Coverall:
☐ Other:

Gloves: ☐ Not Needed
☐ Undergloves:
☐ Gloves: Leather
☐ Overgloves:

☐ Other - specify below:

Monitoring Equipment: Specify by task. Indicate type as necessary. Attach additional sheets as necessary.

Instrument	*Task*	*Action Guidelines*		*Comments (Include schedules of use)*
Combustible Gas Indicator	1 - 3	0-10% LEL 10-25% LEL **>25% LEL** 21.0% 0_2 <21.0% 0_2 **<19.5% 0_2**	No explosion hazard Potential explosion hazard; notify SHSC. **Explosion hazard; interrupt task/evacuate** Oxygen normal Oxygen deficient; notify SHSC **Interrupt task/evacuate**	■ Not Needed Entering tanks, vats, sumps, and other confined spaces is strictly forbidden.
Radiation Survey Meter Type _____	1 - 3	3X Background **>2mR/hr**	Notify SHSO and CDM Federal HSM, establish REZ **Interrupt task/evacuate**	■ Not Needed Radiation is not an expected hazard.
Photoionization Detector Type _____ ☐ 11.7 eV ☐ 10.2 eV ☐ 9.8 eV ☐ ___ eV	1 - 3	**Specify:** **Detectable Odor**	**If odor of any kind is detected, cease work, move to fresh air.**	■ Not Needed If further work is necessary in the area where odors are detected, personnel protection will be evaluated.
Flame Ionization Detector Type _____	1 - 3	**Specify:**		■ Not Needed If further work is necessary in the area where odors are detected, personnel protection will be evaluated.
Detector Tubes/Monitor Type _____ Type _____	1 - 3	**Specify:**		■ Not Needed *Toxic gases are not expected to be* encountered. Entrance into confined spaces where toxic gases could be concentrated is strictly forbidden.
Respirable Dust Monitor Type _____ Type _____	1 - 3	**Specify:**		■ Not Needed If dusty conditions persist, site will be abandoned and personnel protection reevaluated.
Other **Specify: Visible or nuisance dust and/or unusual vapors (odors)**	1 - 3	**Specify: If team notices unusual odors, heavy dust, or irritation of the eyes or throat, they will exit area and reevaluate personnel protection.**		

Decontamination Procedures

Personalized Decontamination

Wash well before hand to mouth contact is made. A shower will be taken as soon as possible after leaving the field. Workers will remove protective clothing in this order:

(1) wash overboots in soapy water and rinse
(2) remove overboots or booties
(3) remove gloves
(4) remove safety glasses
(5) remove Tyvek or cloth coverall, if used
(6) remove respirator, if used
(7) remove inner gloves
(8) wash hands/face before eating/drinking

☐ Not Needed

Sampling Equipment Decontamination

See CDM Federal SOP 4-5. All sampling equipment will be thoroughly decontaminated as follows:

(1) wash and scrub with low phosphate detergent
(2) potable tap water rinse
(3) potable tap water rinse
(4) thoroughly rinse with deionized water
(5) air dry
(6) wrap in aluminum foil for transport

☐ Not Needed

Heavy Equipment Decontamination

See CDM Federal SOP 4-5. All heavy equipment and tool parts that contact subsurface soil are constructed of heavy gauge steel and have no natural or synthetic components that could absorb and retain most soil-borne organic contaminants.

Prior to removal from the work site, potential contaminated soil/groundwater will be scraped or brushed from the exterior surfaces.

The drill rig, augers and any other large equipment in the exclusion zone will be taken to a decon pad and steam cleaned.

■ Not Needed

Containment and Disposal Method

All disposable PPE will be double-bagged prior to disposal. Decon water to be disposed onsite.

☐ Not Needed

Containment and Disposal Method

Decon water to be disposed onsite.

☐ Not Needed

Containment and Disposal Method

All disposable PPE will be double-bagged prior to disposal.

■ Not Needed

Hazardous Materials Inventory (Investigation-Associated Substances: Attach MSDS)

Preservatives

☐ Hydrochloric Acid (HCl)
☐ Nitric Acid (HNO_3)
☐ Sulfuric Acid (H_2SO_4)
☐ Sodium Hydroxide (NaOH)
☐ Zinc Acetate (ZnOAc)
☐ Ascorbic Acid
☐ Other:
☐ Other:

Decontamination

☐ Alconox™
☐ Liquinox™
☐ Acetone
☐ Methanol
☐ Mineral Spirits
☐ Hexane
☐ Isopropanol
☐ Nitric Acid
■ Other: Water

Calibration Gases and Fluids

☐ Isobutylene
☐ Methane
☐ Pentane
☐ Hydrogen
☐ Propane
☐ pH Standard
☐ Conductivity Standard
☐ Other
☐ Other

Health and Safety Plan Form	Environmental Protection Agency -- Region 8 --	CDM Federal Programs Corporation

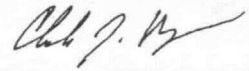
Emergency Contacts	
Water Supply	NA
Site Telephone	1-406-293-8595
EPA Release Report No.	1-800-424-8802
CDM 24-Hour Emergency Chuck Myers	(cell) 1-571-216-7004
Facility Management	NA
Other (Specify) Health & Safety Mgr.	Chuck Myers (home) 1-703-754-0700 SHSO 1-406-293-3567
CHEMTREC Emergency	1-800-424-9300

Emergency Contacts	*Name*	*Phone*
Health and Safety Manager	Chuck Myers, CIH	1-703-968-0900 (office)
Project Manager	Jeff Montera	1-303-295-1237
Site Health & Safety Coor.	Douglas J. Updike	1-816-412-3149
Site Health & Safety Officer	Noel Anderson	1-406-293-3567
EPA Contact	Jim Christiansen	1-303-312-6748
Environmental Agency		1-800-234-5677
Health Department		1-406-293-3757
Sheriff's Department	Lincoln County	911
State Spill Line		911
Fire Department	.	911
Police Department - Libby		911
State Police	Highway Patrol	1-800-525-5555
Poison Control Center		1-800-525-5042
Occupational Physician	Health Resources	1-800-350-4511

Contingency Plans Summarize below:

Evacuate site if any unexpected hazardous conditions are encountered. If staff observe hazards for which they have not been prepared, they will withdraw from the area and call CDM Federal Health and Safety. CDM Federal personnel will leave the site and upgrade their level of protection if they experience nausea or dizziness. No volatile compounds are expected to be encountered at concentrations dangerous to human health. If any odors are noted, work will cease and personnel protection reevaluated. In the event of medical emergency, contact Hospital, Police, or Sheriff's Department. If respirable dust is noted, additional engineering controls will be implemented. If these controls do not eliminate the exposure, personnel protection will be re-evaluated.

Health and Safety Plan Approvals

Prepared by: Doug Updike	Date: 4-01-2002
SHSO Signature:	Date:
HSM Signature: 	Date: 4-05-02
For: Chuck Myers, CIH	

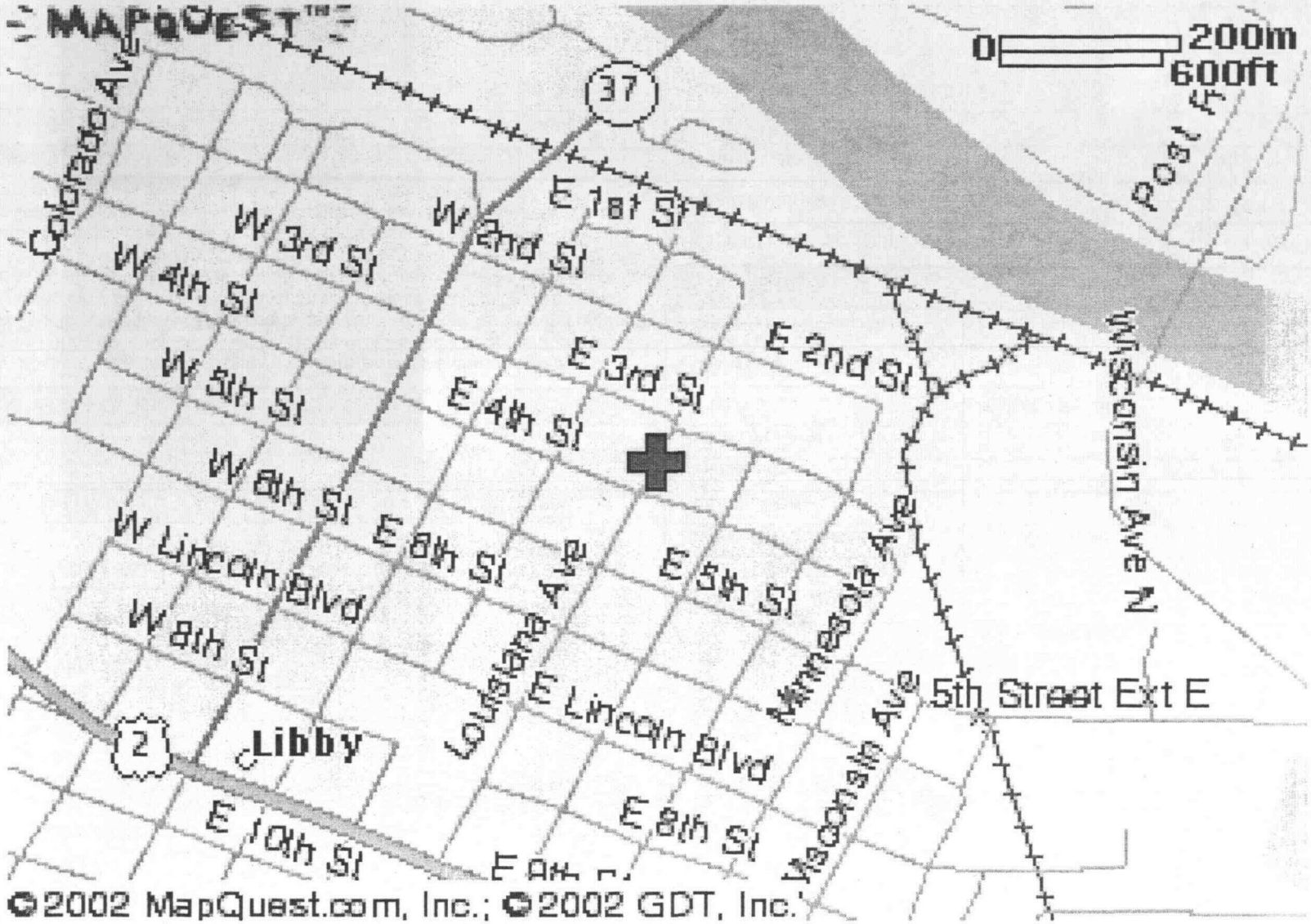
Medical Emergency

Hospital Name: St. John's Lutheran Hospital	406-293-7761
Hospital Address: 350 Louisiana Avenue	
Name of Contact at Hospital: NA	
Name of 24-Hour Ambulance:	911

Route to Hospital (See Figure 1)

Directions to the hospital will vary depending on where you are located in the site area. The hospital is located at the intersection of Louisiana and 4th Avenue.

This Page Reserved for Hospital Route Map: Johns Lutheran Hospital, 350 Louisiana Ave, Libby, MT 59923



7GHSLIB.OU4

Health and Safety Plan Form	Environmental Protection Agency -- Region 8 –	CDM Federal Programs Corporation

The following personnel have read and fully understand the contents of this Health and Safety Plan and further agree to all requirements contained herein.

Site: Libby, Montana, Asbestos Removal	Project No.:

Name and Responsibility	Affiliation	Date	Signature
Jeff Montera	CDM - Denver		
Dave Schroeder	CDM - Fairfax		

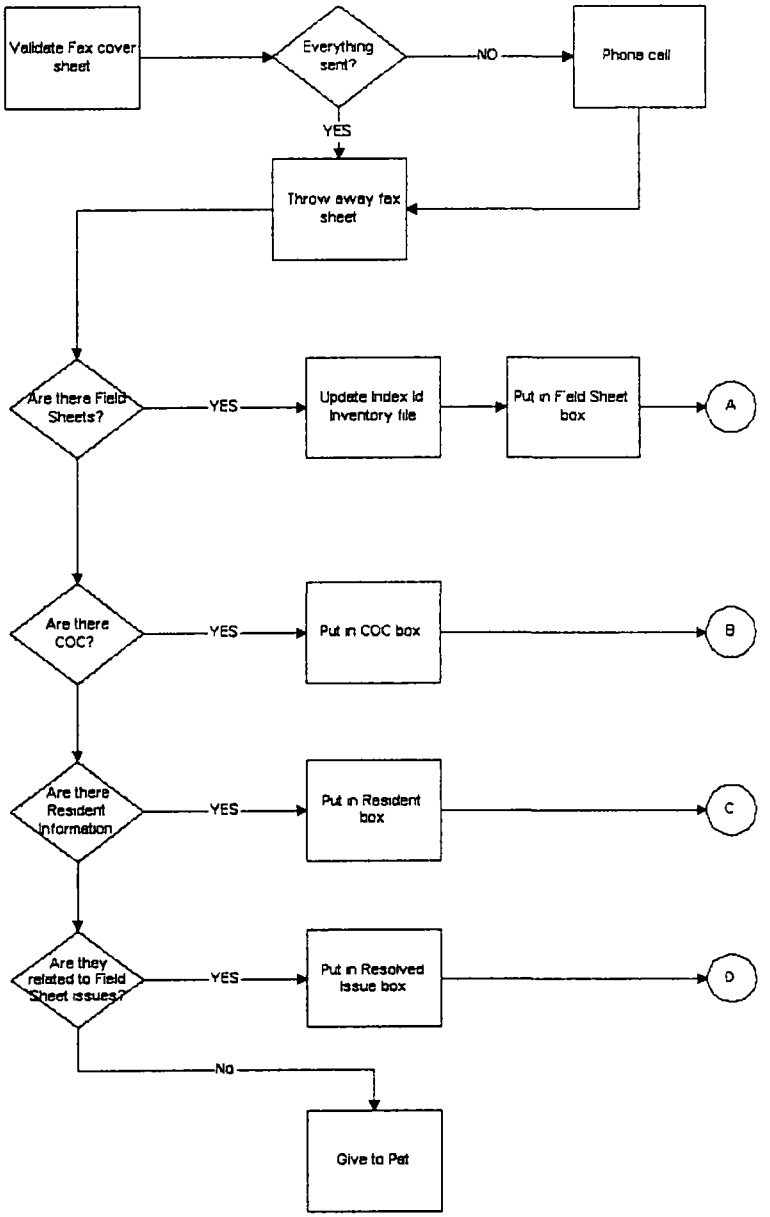
This page intentionally left blank

Appendix C

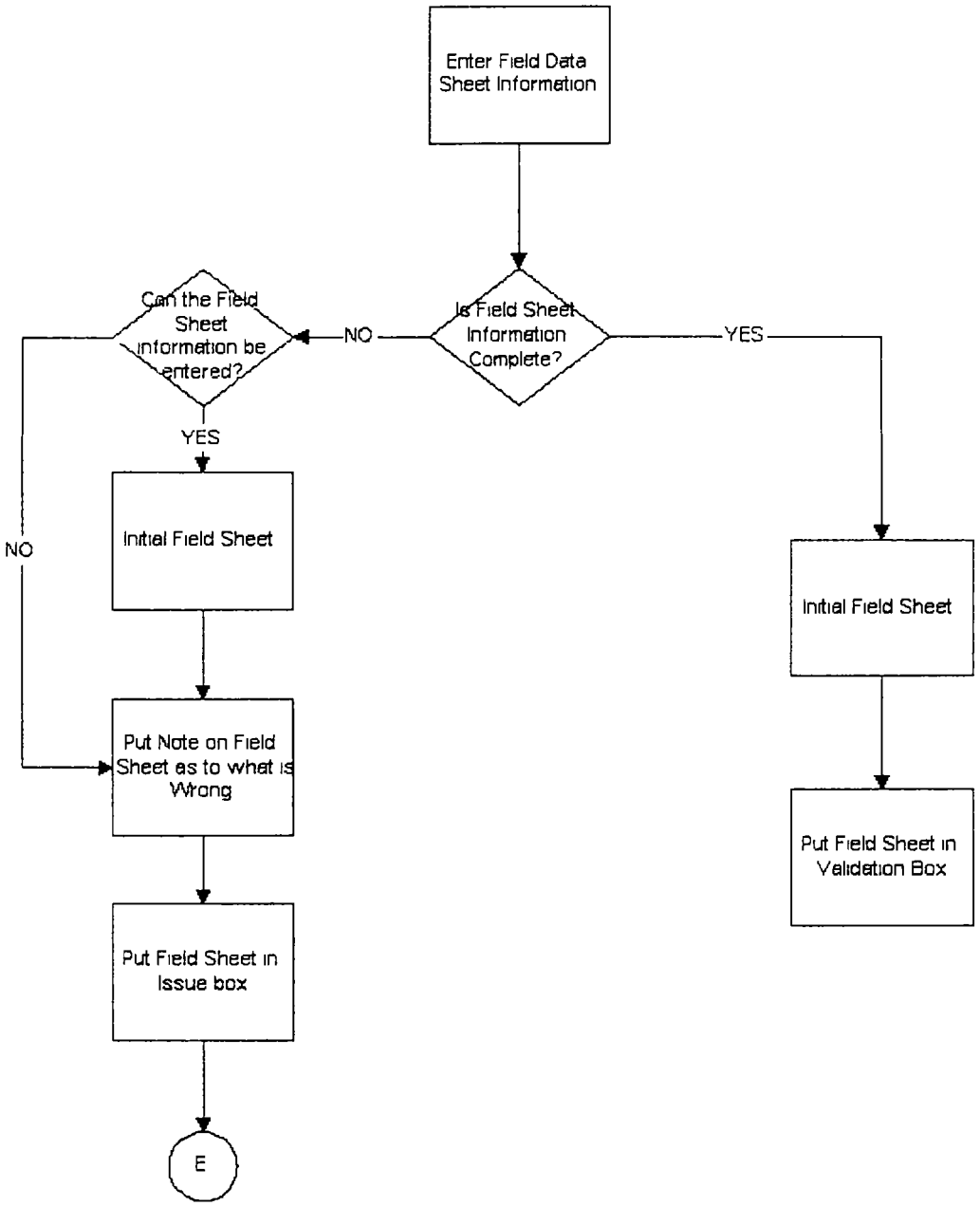
Volpe Center Paperwork Flow Process

This page intentionally left blank

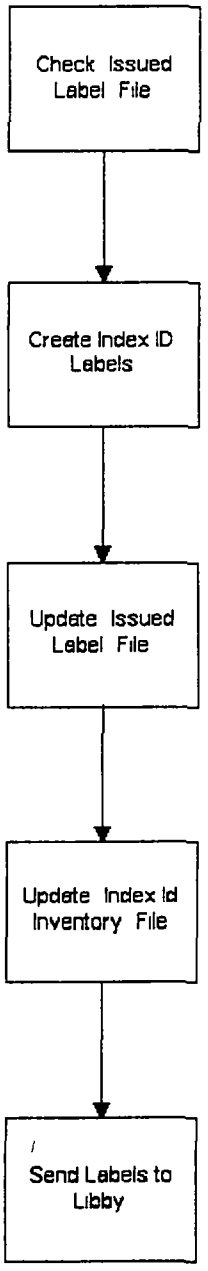
Fax Process


Validate Fax cover sheet
Everything sent?
NO
Phone call
YES
Throw away fax sheet
Are there Field Sheets?
YES
Update Index id Inventory file
Put in Field Sheet box
A
Are there COC?
YES
Put in COC box
B
Are there Resident Information
YES
Put in Resident box
C
Are they related to Field Sheet issues?
YES
Put in Resolved Issue box
D
No
Give to Pat

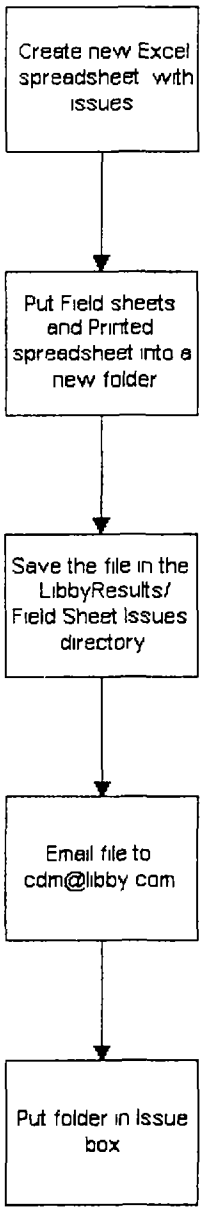
A - Field Sheet Process



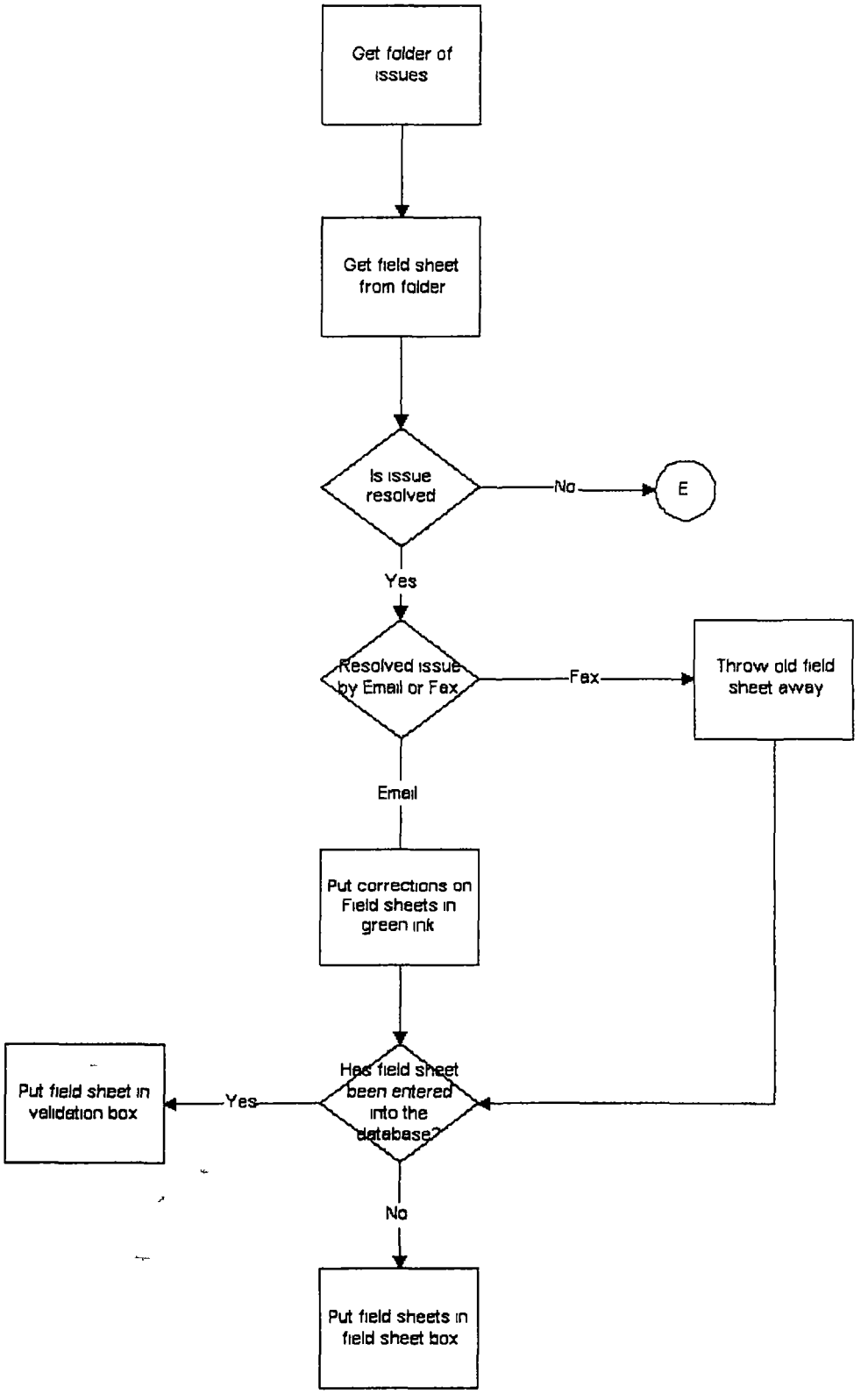
Index Label Process



E - Issue Process



D - Resolve Issue Process



This page intentionally left blank

Appendix D

Laboratory Training Outline

This page intentionally left blank

Draft Laboratory Training Outline (April 4, 2002)

Training Issues of Concern

1 Analytical Procedures

- Method Variances
- QC Requirements
- Visual References

2 Mineralogy Recognition & Definition

- Libby-Type Amphibole
    - (Winchite, Richterite, Tremolite/Actinolite, Edenite/Ferroedenite, & Magnesio-arfvedsnoite)

3 Reporting Requirements

- Data Entry & QA
- Electronic & Hardcopy Submittal

4 Operational Procedural Requirements

- Sample Logging
- What to include in hardcopy laboratory reports
    - spectra, count sheets, QC sheets, etc
- Notification of any WR Grace conflicts of interests (as they occur)
- Sample Archiving

Training Approach

1 Repetition of July 2001 EDS Spectra Characteristic Study for Libby-Type Amphiboles

Each laboratory will need to demonstrate an understanding of the definition of a Libby-type amphibole (LA) and an ability to recognize LAs This will be accomplished by repeating the EDS Spectra Characterization Study, which was performed in July 2001 by Reservoirs Environmental Services, Inc (RESI) and EMSL Analytical, Inc (EMSL) The laboratory will need to perform all study analysis prior to being visited by a Lab Mentor (see Training Approach 2 below) The lab mentor

(while on-site) will review the Laboratorv s plotted EDS results to insure that thev are consistent with the findings of Julv 2001 Following the mentor s review the mentor will provide a recommendation regarding the laboratory s understanding and whether there are any reasons for the laboratorv to repeat the studv (partial or complete)

2 Lab Mentoring Program

Senior personnel from RESI and EMSL that have been involved with providing analvtical support on the Libby Asbestos project (for at least one year) will act as Mentors to new laboratories as requested These lab mentors will travel to the new laboratory and will work with the laboratory s personnel to address the issues as listed above under 'Training Issues of Concern The mentors will follow a training checklist which will be prepared bv RESI in collaboration with Volpe CDM EMSL and EPA Upon completion of the mentor s visit the mentor will document their review with a brief one-page summarv and their recommendation as to whether the laboratory is ready to start accepting project samples or whether additional follow-up training is required The mentor s review summary will become part of CDM s contract file

3 Re-analysis of Project Samples

While the lab mentors are on-site thev will observe laboratorv personnel as they prep and analyze previously analyzed project samples via PLM PCM AHERA & ISO (both direct & indirect) The mentor will verify the use of and instruct the laboratory on project specific variances to insure consistency In addition in the mentor's presence the laboratory will perform an ISO recount same of three previously analyzed project grids (which contained fibers)

Other

- Provide for informational purposes and reference copies of all QAPPs and SAPs
- Laboratory will participate in all scheduled weekly laboratory telecons